

PROBE AND DROGUE AERIAL REFUELING REQUIREMENTS:
HOW WILL AIR FORCE SPECIAL OPERATIONS COMMAND
MEET FUTURE DEMANDS?

BY
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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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Lt Col John S. Shapland began his air force career at the United States Air Force Academy, Colorado Springs, Colorado, graduating in 1989. His first assignment was Euro-NATO Joint Jet Pilot Training (ENJJPT) at Sheppard AFB, Texas. Following graduation in 1990, Lt Col Shapland was assigned as an instructor pilot in the T-38 at the 90th Flying Training Squadron at Sheppard AFB. In 1994 he was selected to transition the HC-130 at the 9th Special Operations Squadron, Eglin AFB, Florida. Lt Col Shapland upgraded to Aircraft Commander, flying the HC-130P/N, then recoded as an MC-130P. In 1997 Lt Col Shapland was selected to become a test pilot, with training at the Empire Test Pilot School (ETPS), located at Boscombe Down, England. Following ETPS he was assigned to Edwards AFB, California to test the C-130J, WC-130J, and T-38C. In 2000 Lt Col Shapland was reassigned to Maxwell AFB where he attended Air Command and Staff College and the School of Advanced Airpower Studies. Lt Col Shapland is a senior pilot with 3700 flight hours in 49 aircraft types. He has a bachelor's degree in Human Factors Engineering from the Air Force Academy, a master's degree in Business Administration from Midwestern State University (Wichita Falls, Texas), a master's degree in Aerospace Engineering from the University of Florida, and a master's degree in the Military Operational Art and Science from Air University. In July 2002, Lt Col Shapland was assigned to command Det 1/46 OG at Hurlburt Field, Florida. He is married to Laura Shapland née Howells of Salisbury, England.

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ABSTRACT

The demands placed on Air Force Special Operations Command (AFSOC) aerial refueling tankers have outpaced United States Special Operations Command's (USSOCOM) ability to organize, train, and equip the current forces to accomplish their mission. This paper asks the question "How will AFSOC meet the requirements for helicopter aerial refueling in the 2007 to 2012 timeframe?" In order to place this question in context a short history of USSOCOM, AFSOC, and helicopter aerial refueling is presented first. Then this paper evaluates the predicted security environment of 2007 to 2012 and the expected shortfalls in AFSOC tanker capabilities. The need to "go deep with precision" is explored, as well as expected solutions to tanker shortages.

Suggestions for improvement to the predicted situation include accelerating the refueling modification of the MC-130H aircraft and purchasing 28 additional aircraft to increase the number of tanker assets. Secondly, the MC-130P should be modified with additional defensive equipment to transition to a "penetrating tanker" status since they are already conducting operations over enemy territory with increased risk. Also, changes to the planning and coordination process are suggested to increase the efficiency and quality of planning for future tanker aircraft. Lastly, it is suggested that SOF and Rescue forces are combined in the future to produce a single air manager for all probe and drogue operations. These improvements will increase the flexibility and decrease the occurrence of tanker limitations on future USSOCOM operations.

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Chapter 1

INTRODUCTION

*If you don't know where you are going,
any road will get you there.*

Henry Kissinger

As the United States prepares for the future it looks to the past. We do not have a crystal ball for future events so we must study history, make observations, learn valuable lessons, and extrapolate to future events. But if there is one lesson that history has taught us, it is that the only thing certain is that our preparations will be inaccurate and incomplete. According to noted historian Sir Michael Howard, doctrine is always wrong, but he whose doctrine is least wrong, and he whose system is most flexible, will win.¹ It is this flexibility and responsiveness that we must build into future strategy and doctrine.

For the past fifty years the US has not had to fight a major conflict for national survival. We have fought to contain communism in the Korean and Vietnam Wars, to maintain access to key economic resources in the Gulf War, and to restore failing and failed states in the Balkans and East Africa. Our nation's borders have been kept safe mainly by our geographic insularity, surrounded by two enormous oceans. The last time a battle was fought on US soil was April 1865 at Richmond and Petersburg, Virginia.²

However, as we hypothesize about future events, certain things come to light. The first is that "we are part of a country with the most powerful military the world has ever seen."³ The 21st Century will offer many advantages and opportunities in the realm of aerospace power. These are already being tested as the nation relies more often on aerospace power to fight and win our nation's wars without US casualties, and with a minimal amount of enemy destruction. Secondly, we are transitioning from a "threat-based" military defensive system to a "capabilities-based" proactive system for the

¹ Michael Howard, "Military Science in an Age of Peace," Chesney Memorial Gold Medal lecture, 3 October 1973, reprinted in *Journal of the Royal United Services Institute* 119 (March 1974): 3-11.

² Geoffrey Barraclough, ed., *The Times Concise Atlas of World History* (Maplewood, N.J.: Hammond Inc., 1982), 92.

³ Maj Gen John Barry, HQ USAF/XPX, interviewed by author, 10 December 2001.

future, in order to devise “a new strategy for America’s defense that will embrace uncertainty and contend with surprise.”⁴ Thirdly, the most prevalent and likely event to disrupt American lives is the “international lawlessness that threatens the stability of current and future democratic and non-democratic governments throughout the world.”⁵ One organization assigned to counteract this “international lawlessness” is the United States Special Operations Command (USSOCOM), and its Air Force component, Air Force Special Operations Command (AFSOC). Together they are tasked to assist in fighting our nation’s battles through direct action missions and a combination of conventional and unconventional warfare.

Uncertain Future

While there is some illumination of the future military path, other things remain unclear. One of these is related to the topic of unrestricted movement of special operations forces. Special operations rely on the use of helicopters to perform their missions of direct action, special reconnaissance, and unconventional warfare.⁶ Helicopters add the mobility to get into and out of areas of restricted access. However, they have relatively short ranges for their radius of action. In order to extend this range helicopters rely on aerial refueling from special operations tankers. But the question is, how many tankers are required and how do we determine this number? And overall, how can AFSOC meet the expected demands for helicopter aerial refueling over the next five to ten years?

AFSOC tanker decisions are crucial. Too many aircraft and they will be underutilized in a time of limited manning and funding. Too few, and a critical helicopter resource goes unused, possibly degrading mission accomplishment. Three factors influence the need to examine tanker requirements. The first is the criticality of the resource. USSOCOM forces rely on the availability of helicopter aerial refueling (Helo AR) during contingency operations. It is assumed that Helo AR will be provided. It is such a given that in peacetime exercises Special Operations Command (SOCOM)

⁴ Donald H. Rumsfeld, *Quadrennial Defense Review*, 30 September 2001, iii.

⁵ General Harry H. Shelton, *SOF Vision 2020* (US Special Operations Command, 2001), 1.

⁶ General Peter J. Schoomaker, *United States Special Operations Forces Posture Statement 2000: Providing Unique Solutions for a Changing World* (US Special Operations Command, 2000), 4.

forces assume it away and “create imaginary refueling islands in the sky” while actually ground-gassing their helicopters.⁷ The resource is so critical that “combat operations in Afghanistan were adversely affected, as timelines expanded, when tankers were unavailable.”⁸

Secondly, the tactical range of operations is continually expanding. In Vietnam helicopters had to remain within 75 miles of a base of operations.⁹ Today, the unrefueled combat radius of a special operations helicopter (MH-53J Pave Low III) can be as great as 240 miles.¹⁰ With aerial refueling this range is extended to the crew endurance limits (in excess of 600 miles radius). Add this to the concept of Global Strike Task Force, and the conclusion is that required combat radii will continue to increase, and aerial refueling will be mandatory. Therefore, an accurate prediction of future needs versus tanker availability and requirements is crucial.

Lastly, the number of “probed” (air refuelable) special operations helicopters has more than doubled in the past ten years, and is predicted to continue on this course (see Table 1). AFSOC has an order for fifty refuelable CV-22s over the next ten years, which when combined with the reductions in MH-53 aircraft and increases in army helicopters will bring the total number of SOCOM probed assets close to 200.¹¹ This represents a four-fold increase between 1990 and 2010. During the last ten years the number of tanker aircraft has remained fairly constant. AFSOC has 24 MC-130H Talon II aircraft that it is planning to modify with a refueling capability over the next three to five years. But there is controversy over whether this is enough or too much, and whether or not to retire the older MC-130Ps and MC-130Es with the addition of the MC-130Hs. Because of this controversy, AFSOC requested an in-depth analysis of the requirements for MC-130 air refueling platforms (MC-130P, MC-130E, and MC-130H) to support special

⁷ Brigadier General Richard L. Comer, Air Force Special Operations Command Vice-Commander, interviewed by author, 28 November 2001.

⁸ Ibid.

⁹ Earl H. Tilford, Jr., “Search and Rescue in Southeast Asia, 1961-1975,” *Air University Review*, Jan-Feb 1980, 62.

¹⁰ “Special Operations Aviation (SOA) Assumptions, Planning Factors, and Performance Data Guide.” *Joint Mission Analysis 2004-2009*. USSOCOM SORR, February 2001.

¹¹ Brigadier General Richard L. Comer, Air Force Special Operations Command Vice-Commander, interviewed by author, 28 November 2001.

operations forces (SOF) rotary wing aircraft and the CV-22.¹² This study must identify the critical assumptions that drive the required force structure, and organizational, material, and training methods to overcome shortfalls. As the one who wins is “he whose system is most flexible,” AFSOC’s goal is to obtain a better understanding of tanker requirements in order to build flexibility into future operations.

Due to these questions, AFSOC’s strategic planning cell made a request for research into the future of AFSOC air refueling tankers. Released to Air University on 4 September 2001, AFSOC/XPPF requested a study “to analyze and compare programmed AFSOC tanker capabilities and requirements in view of the projected international security environment, evolving threats, emerging national military strategy, and programmed inventories of probed aircraft” and “provide recommendations for doctrine, organization, training, materiel, leadership, personnel, and facility solutions.”¹³ This was AFSOC’s first priority research question. The research contained within this paper is focused at adding to the body of knowledge AFSOC will use in the future to make force structure decisions.

Table 1
Chronology of USSOCOM Probe and Drogue Assets

ASSET	Number of Assets		
	1991	1996	2001
MC-130P (HC-130P/N)	24***	24***	24***
MC-130E	14***	14***	14***
MH-53J/M	41*	41*	38*
MH-60G	10*	10*	0*
MH-47D/E (Army)	0**	49 (60s and 47s)**	37**
MH-60K/L (Army)	0**	49 (60s and 47s)**	54**

Sources: * Numbers received from HQ AFSOC/XPQA, Chief Rotary Wing Programs
 ** Numbers from SOCOM/SORR
 *** Numbers from HQ AFSOC/LGMX-AVDO

¹² Air University Research Database, located at <http://research.maxwell.af.mil/index.asp>, accessed 1 October 2001.

¹³ Ibid.

Limitations

Undertaking a project such as evaluating a SOCOM process is a daunting task, which inevitably causes limitations to the study. Some of these are system-imposed, while others are author-imposed. Most of the system-imposed limitations have to do with the classification process within SOCOM. Unfortunately, almost everything historical is classified. There are missions and operations that are under “special categories” and “compartmentalized” from the rest of military operations. Even portions of the 1976 History of the 1st Special Operations Wing (Hurlburt Field) is classified secret through multiple sources.¹⁴ Therefore, even the job of accessing information on the previous uses and shortfalls of Helo AR is a difficult task. Relying on the information that is found at the unclassified level leads to an overabundance of generalities and vagueness.

The second system-imposed limitation is the paucity of written documentation on SOF Helo AR and tanker requirements. This is caused by a combination of the classification process, a task-oriented operational attitude, and the lack-luster appearance of the duty of “passing gas.” Nothing has been published on the ratio of tanker aircraft to refuelable assets with regard to adequacy or limitations. That which has been written down is contained within the bowels of the SOCOM modernization process in Mission Area Plans such as “Provide Mobility in Denied Territory,” which identifies a limitation to special operations mission execution of “the low number of Helo tankers available and heavy tactical reliance on air refueling.”¹⁵ But even this recognition is just a one-line comment in a document filled with numerous other mobility deficiencies.

Another factor leading to a lack of tanker documentation is that the operators knowledgeable about tanker operations are heavily tasked. With an average of over 180 days per year away from home on temporary duty, these “low-density, high-demand assets” just do not have time to write articles about tanker requirements and whether or not the number of tankers available is affecting the AFSOC mission.¹⁶ These people are

¹⁴ History of the 1st Special Operations Wing, Volume 1, IRIS No. 1037456, K-WG-1-HI (CMDO) V.1, 07-01-79 to 12-31-79, in USAF Collection, AFHRA, 1-383.

¹⁵ “Provide Mobility in Denied Territory Mission Area Plan” *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995.

¹⁶ Morrison, Gary P., Lt Col, 9th Special Operations Squadron Operations Officer, interviewed by author, 27 November 2001.

“mission hackers” and “doers”, not “thinkers” nor introspective writers. They are not known for their academic inquisitiveness. Their motto, “Anytime, Anyplace” refers to military operations, not publication or aggrandizement.

Lastly, refueling just is not “sexy.” It’s not at the tip of the spear like fighter operations, and thus doesn’t attract much attention. “Everyone thinks of tankers last . . . and we have never failed to underestimate our need for tankers.”¹⁷ There is seldom a headline on CNN that a tanker missed his rendezvous or that the mission was changed due to lack of tankers. They show up, do their mission, and return to base – no fanfare, and no big deal. Therefore it just doesn’t make the papers, and the available evidence for research is minimal.

The systems-imposed limitations have led to a number of author-imposed limitations for research and this paper. First, the paper will remain in the unclassified realm. Only evidence from unclassified operations and aircraft will be used. This was predominantly obtained from unclassified portions of the classified histories contained within the Historical Research Agency at Maxwell AFB, Alabama. Secondly, AFSOC considers the actual numbers of aircraft assigned to be “for official use only” so numbers will be in generalities. They will be close, but the operational numbers will not be revealed here. Lastly, the paucity of printed material on AFSOC aerial refueling meant that personal interviews were used to collect most evidence for this analysis. A list of the most commonly asked questions is attached as Appendix A. While highly experienced AFSOC and SOCOM operators provided the evidence for this paper, any omissions or inaccuracies remain the responsibility of the author.

Definitions

The main confusion in terminology for this evaluation resides within the terms used in the Air Force Modernization plans. The reader with previous experience with acquisitions and long-range planning should be familiar with all terms contained in this paper. However, the novice to this program will need an explanation of this plan and the major terms used within.

¹⁷ Brigadier General Richard L. Comer, Air Force Special Operations Command Vice-Commander, interviewed by author, 28 November 2001.

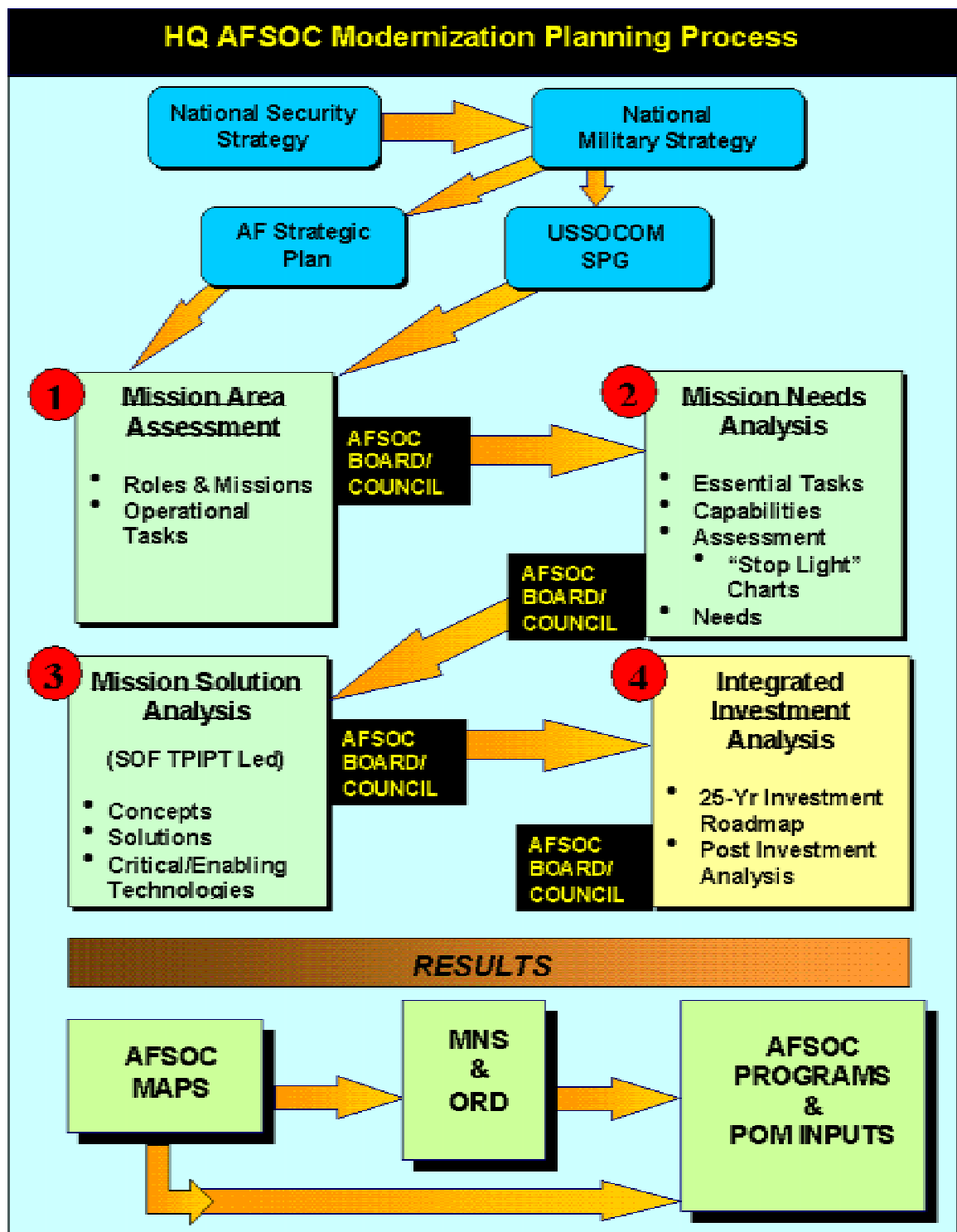
The SOF modernization process starts top-down. With the guidance provided by political and military leadership (National Security Strategy, National Military Strategy, Air Force Vision 2010), the special operations leadership creates its own vision of the future called SOF Vision 2020. With Air Force and SOCOM guidance in hand, strategic planners evaluate the future environment to create a mission area assessment (MAA). “A strategy-to-task methodology is then used to determine the core missions of AFSOC” in the future.¹⁸ From this flows a mission needs analysis (MNA), which prioritizes a list of future needs, and then a mission solution analysis (MSA), which identifies key enabling technology to solve the MNA. The final step is the integrated investment analysis (IIA), which determines a long-term investment plan for the command. This investment roadmap is then rank ordered and a determination is made as to what will be funded in the Program Objective Memorandums (POM). A graphical depiction of this process is on the next page in Figure 1.

While this strategic process is going on, a more tactically-oriented procedure is also underway, called the Joint Mission Analysis (JMA). The JMA is “a methodology used to assist decision making within SOCOM’s Strategic Planning Process (SPP).”¹⁹ From the classified Defense Planning Guidance comes Illustrative Planning Scenarios (IPS), which provide a number of possible scenarios for the use of force. The IPS are “not a prediction of future conflicts, but serve as a basis for the analysis and recommendation of overall SOF war-fighting capability programs and future force structure.”²⁰ The strategic planners use the IPS, with the limitations of current forces, to highlight shortfalls for future planning. These shortfalls are also input into the MNA of the modernization process.

¹⁸ “SOF Mobility AFSOF 2030 Mission Area Plan,” *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, iii.

¹⁹ “Special Operations Command SORR Assessments,” *Assessment Director (AD) Handbook*. USSOCON/SORR, 2001, 137.

²⁰ *Ibid*, 134.



Source: Lt Col Scott L Howell, "FY 04-29 Mobilization Plan AFSOF 2030," lecture, Hurlburt AFB, FL, 17 December 2001, slide 16.

Figure 1
AFSOC Modernization Process

Within the JMA process are three terms of use later in this paper: Risk Evaluation Force (REF), Objective Force (OBJ Force), and Program Objective Memorandum Force (POM Force). The REF:

is the force necessary to achieve U.S. national military objectives with reasonable assurance of success, as identified through IPS and stated time lines, deployed force data, theater CINCs, Component Commanders, the Office of the Secretary of Defense for Special Operations and Low Intensity Conflicts (OASD SO/LIC), and USSOCOM Headquarters input.²¹

This force covers the peak requirements in the IPS. The OBJ Force “is the desired force in terms of structure, readiness, modernization, and sustainability which is constrained by fiscal and manpower levels.”²² Finally, the POM Force is what is actually paid for by the US Legislature. In each step of the process the force numbers are usually cut down.

The last definitions required are for common terms used in helicopter aerial refueling. “Helo AR” has already been defined. Next is the term “probe and drogue” which refers to the type of refueling accomplished between a SOF tanker with a drogue (MC-130E or MC-130P) and any SOF aerial refuelable helicopter with a probe (MH-53J/M, MH-60K/L, or MH-47D/E) or CV-22 Osprey. Unlike the navy KC-130, the SOF MC-130s are not currently configured with high speed or variable speed drogues and would have to land and reconfigure to be able to refuel anything other than a helicopter at approximately 110 knots.

Roadmap

A five-step procedure will be employed to evaluate the strategic planning process used to determine tanker requirements and recommend future force allocations. First is a review of the relevant historiographic evidence relating to SOF Helo AR and previous tanker studies. While much of this information is still classified, the history of SOF aerial refueling was a direct result of Air Rescue and Recovery Service helicopter refueling operations from the Vietnam War, which has been declassified.²³ With an understanding of the history of Helo AR bringing us up to the present day, an evaluation

²¹ Ibid, 144.

²² Ibid, 140.

²³ Maj Tracy W. Colburn, “Running on Empty: The Development of Helicopter Aerial Refueling and Implications for Future USAF Combat Rescue Capabilities,” (unpublished research paper for Air Command and Staff College, Maxwell AFB, AL, March 1997).

of the predicted strategic environment in five to ten years (2007-2012) will be conducted to set the contextual environment for the analysis and recommendations.

The third step in the evaluation process involves a comparison between predicted refueling assets and refueling requirements in the timeframe involved. This includes an analysis of the forecasting elements used to predict the quantity of assets required and a comparison of those predictions to current operations. Within this step, suggestions are made for improvements to the current strategic planning model for making force structure decisions. The fourth step proposes training, materiel, and organizational solutions to meet future demands for SOF Helo AR. The fifth step in the evaluation is a conclusion. This summary and wrap-up ties the evaluation together, restates the principal findings, and highlights the need for improvements to the strategic planning process for the critical task of helicopter aerial refueling.

The methodology used to conduct the historical review and set the predicted contextual environment was extensive interviews with senior AFSOC and SOCOM leaders along with an in-depth review of published material available at the Air University library, the Air Force Historical Research Agency, and the SOCOM and AFSOC historical libraries. The force structure analysis was accomplished by an evaluation of the JMA process and the assumptions inherent in the model. Recommendations are a combination of author analysis and suggestions from the many commanders, operators, and planners interviewed.

This introduction has set the stage for developing a suitable method for determining the necessary SOF tanker requirements to meet expected demands in the 2007-2012 timeframe. The relevancy of this research revolves around a need to meet future SOF aerial refueling needs with a force structure commensurate with the predicted strategic environment. A failure to plan, or a mismatch between resources and needs, would lead to wastage of assets that AFSOC wants to avoid. The Helo AR capability is increasingly becoming a required attribute for all SOF operations. This evaluation will help to define the future strategic environment and required assets to maintain the necessary operational capabilities for future contingencies. The next chapter discusses the historical background to further set the stage for the rest of the paper.

Chapter 2

HISTORICAL BACKGROUND

*To be ignorant of what occurred before you were born
is to remain always a child. For what is the worth of human life,
unless it is woven into the life of our ancestors by the records of history?*

Cicero

“Special operations have been a part of our military history since the colonial era. In every conflict since the Revolutionary War, the United States has employed special operations tactics and strategies to exploit enemy vulnerabilities.”¹ These have ranged from psychological operations, through specialized warfighting tasks such as guerilla warfare tactics, to direct action tasks involved in mainstream warfighting capabilities. Recent history has led the US to maintain specialized forces “capable of performing extremely difficult, complex, and politically sensitive missions on short notice, in peace and war, anywhere in the world.”² In 1986 Congress mandated the creation of the United States Special Operations Command (USSOCOM) with the responsibility to “prepare and maintain combat-ready special operations forces (SOF) to successfully conduct special operations, including civil affairs and psychological operations.”³ The workhorse of USSOCOM has been the helicopter in its numerous army and air force variations, with the range-extending addition of helicopter aerial refueling. This capability has grown with SOF from a minor tactic to a required element driving modern battlefield operations.

Special Operations and US Special Operations Command

What we think of today as special operations began in World War II as the Air Commandos. In August 1943, General Henry H. “Hap” Arnold met with British Admiral Lord Louis Mountbatten at the Quebec Conference “to discuss plans for the American air support of British commando expeditions in the China-Burma-India theater of

¹ General Peter J. Schoomaker, U.S. Army, USSOCOM Commander in Chief, “Posture Statement 2000,” *United States Special Operations Forces*. USSOCOM, 2000, 1

² Ibid.

³ Ibid.

operations.”⁴ At this meeting General Arnold promised “tactical air support for British Major General Orde Wingate’s projected Burma offensive.”⁵ This resulted in the creation of the 5318th Provisional Air Unit on 29 November 1943, which became the 1st Air Commando Group (ACG) on 29 March 1944. Its missions included supply, escort, evacuation, and interdiction of enemy supplies through the middle of 1945. In the European theater, SOF were conducting “Operation CARPETBAGGER,” out of bases in England, “delivering supplies, agents, and leaflets behind enemy lines, using highly modified, mission unique, black painted B-24s.”⁶ The agents dropped behind enemy lines were used to relay vital intelligence data critical to the success of the Normandy invasion.

Following World War II the 1st ACG was disbanded as part of the force drawdowns. Special air support was resurrected in Korea in 1953 under the guise of the 580th, 581st, and 582nd Air Resupply and Communication Wings. Their missions included unconventional warfare and counterinsurgency operations, “including the ability to recover downed airmen and the full spectrum of covert air operations.”⁷ Special forces were also utilized throughout the Vietnam War, with perhaps the most published mission being the failed attempt to release Prisoners of War from the Son Tay camp in 1970.

During the post Vietnam decline, special operations became almost nonexistent, until Operation EAGLE CLAW (also called Operation RICE BOWL), the attempt to rescue American hostages from the United States embassy in Iran in April 1980. This mission was doomed from the start from a combination of errors including the use of inappropriate helicopters for the mission, a lack of proper training, and the fog and friction of desert operations. The maintenance failure of three of the six helicopters prior to the refueling point caused the mission to change from a rescue mission to an abort. The ensuing dust storm and crash of an RH-53D into a parked HC-130P at the Dessert One location turned an aborted mission into a tragedy as eight American airmen and two aircraft were lost at the crash site.⁸

⁴ *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHRA.

⁵ History of the 1st Special Operations Wing, Volume 1, IRIS No. 1037456, K-WG-1-HI (CMDO) V.1, 07-01-79 to 12-31-79, in USAF Collection, AFHRA, 10.

⁶ *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHRA, 4.

⁷ *Ibid.*, 7.

⁸ Major Joseph J. Falzone, USAF, *Combat Search and Rescue: CSEL Enhancements for Winning Campaigns* (Maxwell AFB, AL.: Air University Press, 1994), 5-6.

One observation from the aftermath of Operation EAGLE CLAW was that “the Department of Defense should establish a counterterrorism task force with a permanently assigned staff and forces.”⁹ In order to correct the serious deficiencies in the ability of the United States to conduct special operations and engage in low-intensity conflict, Public Law 99-661, legislated by Congress in 1986, “mandated the creation of United States Special Operations Command (USSOCOM).”¹⁰ USSOCOM was activated on 16 April 1987 as the result of the Nunn-Cohen Amendment to the Goldwater-Nichols Act of 1986 (National Defense Authorization Act). It was created as a unified combatant command with all active and reserve SOF (Air Force, Army, Navy, and Marine Corps) in the United States assigned. Five specific special operations missions were identified for USSOCOM: Counter-Terrorism, Special Reconnaissance, Direct Action, Unconventional Warfare, and Foreign Internal Defense.¹¹

Air Force Special Operations Command

Air Force Special Operations Command (AFSOC) is a direct descendant of the Air Commandos of World War II. The 1st ACG was disbanded following the war, to begin its resurrection at Hurlburt Field in April 1961. Under the “Jungle Jim” initiative, directed by General Curtis E. LeMay, it had a two-fold mission: counterinsurgency training and combat missions. This squadron of Air Commandos “deployed a detachment to Bien Hoa, Republic of Vietnam, on Operation FARMGATE” in November 1961, flying some of the first US combat missions in Vietnam.¹² The 1st ACG was reestablished under Tactical Air Command (TAC) on 27 Apr 1962 with two squadrons, and expanded to the 1st Air Commando Wing on 1 June 1963.¹³

The next expansion of the Air Commandos came in the spring of 1962. In an open letter to the armed services, President John F. Kennedy said:

⁹ *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHR, 10.

¹⁰ General Peter J. Schoomaker, U.S. Army, USSOCOM Commander in Chief, “Posture Statement 2000,” *United States Special Operations Forces*. USSOCOM, 2000, 4.

¹¹ General Peter J. Schoomaker, U.S. Army, USSOCOM Commander in Chief, “Posture Statement 2000,” *United States Special Operations Forces*. USSOCOM, 2000, 4.

¹² *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHR, 8.

¹³ History of the 1st Special Operations Wing, Volume 1, IRIS No. 1037456, K-WG-1-HI (CMDO) V.1, 07-01-79 to 12-31-79, in USAF Collection, AFHRA, 12.

The military challenge to freedom includes the threat of war in various forms, and the actual combat in many cases. We and our allies can meet the thermonuclear threat. We are building a greater conventional deterrent capability. It remains for us to add still another dimension: the ability to combat the threat known as guerilla warfare.¹⁴

The Department of Defense response to this was to prepare forces for guerilla warfare with the establishment of the Special Air Warfare Center (SAWC) on Eglin AFB on 27 April 1962.¹⁵ SAWC's first regulation, Tactical Air Regulation 23-12, published on 13 July 1962, defined as their mission "to command, organize, equip, train, and administer assigned or attached forces to participate in and conduct combat improvement projects for air actions in counterinsurgency warfare and other special operations."¹⁶ SAWC's major responsibilities included testing and evaluating projects for early use, modifying existing equipment for special warfare, and providing forces for "supporting, instructing, and advising friendly foreign forces in counterinsurgency warfare."¹⁷

The Special Air Warfare Center obtained assets including O-1 and O-2 observation planes, A-37 and A-1 attack fighters, and C-46, C-47, C-119, C-123, and C-130 transport aircraft in the mid-1960s. The Air Commandos deployed to Laos and Thailand on Operation WATERPUMP in 1964 on counterinsurgency operations, and to Mali, Greece, Saudi Arabia, Ethiopia, Iran, and the Republic of Congo by 1966. On 8 July 1968, "the USAF SAWC was redesignated USAF Special Operations Forces (USAFSOF) and became the equivalent of a Numbered Air Force."¹⁸

In June 1974, USAFSOF was redesignated the 834th Composite Wing (TCW) and began to incorporate additional conventional roles and missions such as aerial delivery and direct actions. In July 1975 the 834th TCW was renamed the 1st Special Operations Wing (SOW). Following the tragic losses during Operation EAGLE CLAW, special operations transferred from TAC to Military Airlift Command (MAC) in March 1983,

¹⁴ Ibid.

¹⁵ Lt. Col David J. Dean, USAF, *The Air Role in Low-Intensity Conflict*. Maxwell AFB, AL: Air University Press, 1986, 89.

¹⁶ USAF Special Air Warfare Center (TAC), *History*, 1 April-31 December 1962, vol. 2, supporting document 8, 1. In USAF Collection, AFHRA.

¹⁷ Dean, 92.

¹⁸ Ibid, 9.

and became a part of 23rd Air Force (23 AF).¹⁹ With the National Defense Authorization Act of 1986, the creation of USSOCOM trickled over into the creation of Air Force Special Operations Command (AFSOC). On 22 May 1990 General Larry D. Welch, Air Force Chief of Staff, redesignated 23 AF as Air Force Special Operations Command, a major command and USSOCOM's air force component.²⁰

AFSOC now has three special operations wings, two forward-based special operations groups, and one special tactics group. The nine AFSOC core missions include "Aerospace Advisory Operations, Combat Support, Information Warfare, Personnel Recovery, Recovery Operations, Precision Aerospace Fires, Psychological Operations, Specialized Aerospace Mobility, and Specialized Refueling."²¹ The special operations collateral activities that AFSOC supports are "Coalition Support, Combat Search and Rescue (CSAR), Counterdrug Activities, Humanitarian Demining Activities, Security Assistance, Humanitarian Assistance, Peace Operations, and Special Activities."²²

Helicopter Aerial Refueling

One of the specialized missions of AFSOC is helicopter aerial refueling (Helo AR), which was born out of a requirement in Vietnam to extend the operational capability of the Air Rescue Service (ARS). The first helicopters used in recovery operations in Vietnam were the HH-43 "Huskies" or "Pedros."²³ These ungainly aircraft had a top speed of 90 knots and a radius of action of only 75 miles.²⁴ This was unacceptable for ARS missions in 1964. In July 1965 the ARS borrowed CH-3C cargo helicopters from TAC for use in recovery operations. The CH-3's greater speed and size improved the ARS capabilities, but their 200-mile combat radius still limited operations. Added to this problem was the slow response time for a downed airman, and the low power capability of the CH-3C to hover out of ground effect with full fuel and any load,

¹⁹ Ibid, 11.

²⁰ Ibid. 12.

²¹ "SOF Mobility AFSOF 2030 Mission Area Plan," *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 11.

²² Special Operations Command SORR Assessments," *Assessment Director (AD) Handbook*. USSOCON/SORR, 2001, 5-6.

²³ Maj Tracy W. Colburn, "Running on Empty: The Development of Helicopter Aerial Refueling and Implications for Future USAF Combat Rescue Capabilities," (unpublished research paper for Air Command and Staff College, Maxwell AFB, AL, March 1997), 5.

²⁴ Earl H. Tilford, Jr., "Search and Rescue in Southeast Asia, 1961-1975," *Air University Review*, Jan-Feb 1980, 62.

which made the CH-3C unsuitable for combat search and rescue operations.²⁵ An urgent plea went out by the Military Air Transport Service commander, General Howell M. Estes on 28 October 1965 to the Air Force Chief of Staff for an air refueling capability.²⁶

Luckily, a solution to aerial refueling was underway when the plea for the capability was made in 1965. On 7 August 1964, “the Air Rescue Service submitted a Qualified Operational Requirement for an air-to-air refueling system for the CH-3C.”²⁷ Concurrently, on 1 July 1964, “PA-65A-SC-1 authorized funds for the procurement of 33 HC-130H aircraft” for special operations.²⁸ These aircraft would become tankers for the first refuelable helicopters. Also, a forward-looking group of flight test engineers at Wright Patterson AFB, “hypothesized that helicopters could ride on the top of wingtip vortices trailing behind a C-130 Hercules transport aircraft.”²⁹ A feasibility test at Wright-Patterson in 1965 demonstrated good compatibility between the CH-3 and a C-130 aircraft.

A small group of Air Force and civilian engineers in the H-3 systems program office at Wright-Patterson AFB set out to take the tests one step further in response to the ARS operational requirement for helicopter air refueling capability. Mr. James Eastman, Mr. Richard Wright, and Major Harry Dunn (helicopter pilot) hoped to demonstrate the feasibility of helicopter refueling in-flight from behind a C-130 Hercules. In December 1965 Major Dunn configured an Air Force CH-3 with a mock air-refueling probe on its nose. After coordination with a Marine Corps KC-130 squadron at Cherry Point NC, Major Dunn flew the CH-3 there for testing. On 17 December 1965, Dunn and Wright rendezvoused with a Marine Corps fighter aerial refueling tanker and eased the fake probe into the drogue basket behind the KC-130. “Thus, they single-handedly launched perhaps the most important innovation in helicopter operations since Igor Sikorsky first took to the skies decades earlier.”³⁰

²⁵ Coburn, 7.

²⁶ General Howell M. Ester, Jr., Commander of Military Air Transport Service (MATS), briefing to General John P. McConnell, Subject: Combat aircrew recovery in Southeast Asia, 28 October 1965.

²⁷ Earl H. Tilford, Jr., *The United States Air Force Search and Rescue in Southeast Asia*. Washington D.C.: Office of Air Force History, 1980, 70.

²⁸ Staff History Headquarters USAF Directorate of Production and Programming DCS/S&L, IRIS No. 906763, K144.01 V.5, 01-01-65 to 06-30-65, in USAF Collection, AFHRA, 24.

²⁹ Coburn, 9.

³⁰ Ibid, 10.

By 19 May 1966 the Aeronautical Systems Division at Wight Patterson AFB had completed their tests on the refueling capability of the C-130 and CH-3 aircraft. “Satisfied with the feasibility of in-flight refueling, the Air Force approved an initial rescue service order for eleven HC-130Hs converted for the aerial refueling role.”³¹ These became the first HC-130P air force aerial refueling tankers. The first in-flight transfer of fuel between an HC-130P and an HH-3E aircraft occurred on 14 December 1966, and air force crews were conducting combat Helo AR in June 1967 over the jungles of Southeast Asia.³² In-flight refueling offered rescue forces added flexibility by extending the helicopter’s range while allowing them to orbit, “thereby cutting down the time it took to reach airmen down in Vietnam and Laos.”³³



Figure 2
Helicopter Aerial Refueling

³¹ Tilford, *The United States Air Force Search and Rescue in Southeast Asia*, 84.

³² Ibid, 82-83.

³³ Ibid, 85.

Recent Operational Uses

The mechanics of helicopter aerial refueling has changed little since its combat introduction in 1967. The aircraft have been upgraded with features such as Night Vision Goggle (NVG) and Forward Looking Infra-Red (FLIR) capabilities enabling nighttime Helo AR to counteract the threat of small arms and short-range surface to air missiles (SAMs). HC-130Ps are still used, but the helicopters have progressed to the MH-53s, MH-47s, and MH-60s with added range, firepower, and armor. The upgrades have turned the helicopter aerial refueling from a daytime, fair-weather procedure to a night, low-level, employment tactic required by SOF operations.

When special operations saw the potential of Helo AR, they immediately wanted to copy it for their own use. In the mid 1980s the ability to refuel a helicopter in-flight at night was still treated as an emergency procedure, as aircrews wore parachutes during the maneuver.³⁴ To obtain this capability, special operations acquired aircraft from the ARS (called Air Rescue and Recovery Service [ARRS] after 8 January 1966³⁵) to fulfill SOF missions. Special operations growth “left no combat capability for ARRS. The only helicopters remaining in rescue squadrons were considered non-combat capable.”³⁶ By 1986, Special operations forces (23 AF) had acquired MC-130E and HC-130P/N aircraft for refueling, and MH-53 air refuelable helicopters, adding MH-60G aircraft in 1989.

The overt operational use of helicopter aerial refueling for special operations missions began with Operation JUST CAUSE, in December 1989, as MH-60G Pave Hawk, MH-53J Pave Low, and HC-130P/N Combat Shadow aircraft were deployed to the Republic of Panama to “secure the safety of American citizens and American interests in the Panama Canal Treaty, to establish law and order, to restore democracy, and to bring Panama’s dictator Manuel Noriega to justice.”³⁷ The helicopters were used for direct action missions and in the case of the need for combat search and rescue (CSAR), while the fixed wing aircraft were used as tankers.

³⁴ Colonel Lyle M. Koenig, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

³⁵ Tilford, *The United States Air Force Search and Rescue in Southeast Asia*, 75.

³⁶ Joe E. Tyner, “AF Rescue & AFSOF: Overcoming Past Rivalries for Combat Rescue Partnership Tomorrow.” (U.S. Navy Postgraduate School Research Report, 1998), 31.

³⁷ “Hurlburt Field Heritage,” On-line internet, 19 February 2001. Available from <http://www.hurlburt.af.mil/milonly/heritage/> and *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHR, 12.

In Operation DESERT SHIELD and DESERT STORM the same aircraft were again used for “direct action missions, combat search and rescue, infiltration, exfiltration, air interdiction, special reconnaissance, and helicopter air refuelings” from Saudi Arabia and Turkey.³⁸ According to the DOD final report to Congress, for CSAR operations, “SOF aircraft were preferred because of their radar evasion, communications, and weapons systems countermeasures capabilities that were considered important for aircraft survivability.”³⁹ HC-130P/N refueling tankers flew 315.7 flying hours in 103 combat sorties during the 39 days of the war.⁴⁰ Following the war, MH-60G and HC-130P/N aircraft remained in both areas of responsibility (AORs), rotating with Rescue and Marine Corps forces, to provide CSAR capabilities for the multinational forces enforcing the no-fly zones over Iraq for Operations PROVIDE COMFORT, SOUTHERN WATCH, and NORTHERN WATCH, up until present (May 2002).

Concurrently with never-ending operations in the desert, SOF forces have conducted numerous other missions requiring Helo AR. In April 1996 Special Operations deployed MH-53 and HC-130P/N aircraft for rescue operations in Dubrovnik, Croatia for the crash of the T-43 carrying Commerce Secretary Ron Brown and 35 others.⁴¹ In 1999, the 9th Special Operations Squadron (9 SOS)⁴² deployed three tanker crews to Operation ALLIED FORCE “to provide combat rescue for NATO aircrews flying strike missions into Serbia.”⁴³ Special operations helicopters and tankers twice flew behind Serbian lines to rescue downed pilots.⁴⁴ In addition to these published operations, numerous exercises and classified missions were flown, stretching AFSOC refueling assets to the limits.⁴⁵

³⁸ *Heritage of the Quiet Professional*, K317.04-2, January 1996, in USAF Collection, AFHR, 13-14.

³⁹ Joint Publication 3-50.21 (draft), *Joint Tactics, techniques and Procedures for Combat Search and Rescue*, I-3.

⁴⁰ Randy G. Bergeron, *Desert Shield/Desert Storm: Air Force Special Operations Command (AFSOC) in the Gulf War*. HQ AFSOC, May 2001, 101.

⁴¹ History of the Air Force Special Operations Command, 1 Jan – 31 Dec 1999, K317.01 V.1, in USAF Collection, AFHRA.

⁴² The 9 SOS is AFSOC’s (and USSOCOM’s) primary helicopter refueling squadron. They have HC-130P/N Shadow aircraft, which were recoded as MC-130P Shadow aircraft in 1996 to mirror the special operations nomenclature of the MC-130E Talon I and MC-130H Talon II aircraft.

⁴³ History of the 16th Special Operations Wing, 1 Jan – 30 Jun 1999, K-WG-16-HI V.1, in USAF Collection, AFHRA, 62.

⁴⁴ Bruce Rolfsen, “Finding a New Home,” *Air Force Times*, 25 February 2002.

⁴⁵ History of the 16th Special Operations Wing, 1 Jan – 30 Jun 1999, K-WG-16-HI V.1, in USAF Collection, AFHRA, 62.

Most recently AFSOC aircraft have been conducting aerial refueling in support of special operations missions in Operation ENDURING FREEDOM. These have included direct action, infiltration, exfiltration, and Combat Search and Rescue missions. In the landlocked country of Afghanistan, providing anti-access problems for helicopter aircrews, aerial refueling has been a prerequisite. According to the 20th Special Operations Squadron Commander, Lt Col Michael Kingsley, “the southern operations in Afghanistan were tanker dependent.”⁴⁶ The distances, altitudes, and aircraft loads made aerial refueling a required part of the mission. Helo AR has become a critical enabler of SOF mobility operations in the War on Terrorism.

Currently (2002) the assets used in aerial refueling within SOCOM are the MC-130E Combat Talon I and the MC-130P Combat Shadow. The MC-130H Combat Talon II is undergoing modifications to be able to refuel helicopters and the CV-22, which are scheduled for acquisition between 2006 and 2013 (initial operational capability in 2009).⁴⁷ The main difference between the Shadow and the Talons is that the Talons have additional defensive equipment for defeating enemy threat systems. They are considered “penetrating tankers” while the Shadow is not (at least not officially). The refuelable helicopters are the US Air Force MH-53Js and MH-53Ms, the Army MH-47Ds and MH-47Es, and the Army MH-60Ks and MH-60Ls. The upcoming CV-22 Osprey will also be air refuelable. A complete list and description of these assets is contained in Appendix C.

Results and Limitations from Operations

Reading the “Lessons Learned” portions of after-action reports from combat operations involving AFSOC air refueling assets (both classified and public accounts) leads to one observation: this critical capability has been heavily stressed.⁴⁸ Only the operational drive and commitment of the current air commandos, with their “Anytime, Anyplace” attitude seems to enable them to meet their commitments. One such report from an unclassified source is the 9 SOS history report from 1995:

⁴⁶ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

⁴⁷ Major Todd A. Lovell, Det 1, 18th FLTS/CV-22 (AFOC), interviewed by author, 2 May 2002.

⁴⁸ Research included reading all Histories from January 1990 to December 2001 for Special Operations Command and 16th Special Operations Wing contained in the Air Force Historical Research Agency, Maxwell AFB, AL.

The 9 SOS has been losing aircraft at a steady pace – three to be exact. This loss leaves the 9 SOS with nine aircraft to conduct all operations. The loss of aircraft, although not devastating, does make it harder to meet the customer's needs. [With the continual increase in the number of probed helicopters and the decrease of tanker aircraft] it becomes more and more difficult to train personnel and continue to keep the customer happy.⁴⁹

Interviewing the commander, Lt Col Monty Sexton stated that his crews were stretched to their limits. He had people in the mid 1990s gone on temporary duty (TDY) for between 180 and 210 days a year. They have been “probing everything that moves at Fort Campbell” and that has driven the required refueling schedule to new heights.⁵⁰ That was having a deleterious effect on his retention of trained crews. The shortfall of tankers was starting to effect operational use of SOF helicopters and missions.⁵¹

This was seen vividly by the AFSOC Vice-Commander, Brigadier General Richard Comer in recent operations in Afghanistan during Operation ENDURING FREEDOM (OEF). For this operation AFSOC deployed “pretty much every tanker asset available.”⁵² And this is not a new idea. Panama, Iraq, and Mayaguez operations “all needed hoses—every single one we had.”⁵³ “We had to activate the Reserves as soon as this (OEF) thing kicked off.”⁵⁴ But even with every resource available AFSOC was unable to meet the demand for helicopter aerial refueling. The army had to ground-gas through fuel bladders and FARP (Forward Arming and Refueling Point) operations.⁵⁵ In the harsh desert environment of Afghanistan, “the sand was eating up helicopter engines” while they were in the low hover.⁵⁶ Many of these aircraft will not return to the US.

⁴⁹ History of the 16th Special Operations Wing, 1 Jan – 30 Jun 1995, K-WG-16-HI V.1, in USAF Collection, AFHRA, 61-64.

⁵⁰ Lt Col Monty Sexton, AFSOC IG, former 9th Special Operations Squadron Commander, interviewed by author, 28 November 2001.

⁵¹ Ibid.

⁵² Brig Gen Richard L. Comer, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

⁵³ Ibid.

⁵⁴ Colonel Dennis L. Barnett, Director of Staff, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 28 November 2001

⁵⁵ FARP operations involve MC-130 aircraft refueling helicopters on the ground through transfer hoses. This is how the helicopters during Operation EAGLE CLAW were supposed to be refueled.

⁵⁶ Brig Gen Richard L. Comer, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

This opinion was also confirmed by Lt Col Michael J. Kingsley, 20th SOS Commander (MH-53 squadron), upon his return from Operation ENDURING FREEDOM. He stated that “the 160th [SOAR] was hurting for currency requirements” and that “it was showing during OEF.”⁵⁷ The lack of currency made operations less efficient and more dangerous than they otherwise would have been. The less-proficient army helicopter crews were having many more problems with aerial refueling than their AFSOC brethren. This was causing the army helicopter crews to ground-gas more often, and subsequently caused increased maintenance problems.⁵⁸

USSOCOM and Aerial Refueling History

The marriage of special operations and helicopter aerial refueling has come far since the advent of Helo AR during the Vietnam War. Today’s special operations units were born out of a need to counter asymmetric warfare tactics. Helicopter aerial refueling was born out of a demand to extend the range of a critical resource. When placed together SOF and Helo AR provide the commander the resources to input and extract his specialized teams in anti-access areas of the world previously inaccessible. This capability is no longer an added benefit for operations; it is a required element in SOF missions. However, the tankers’ capacity to meet helicopter demands is currently pushing its limits. The next chapter will evaluate the future strategic environment and how it will effect SOF aerial refueling operations.

⁵⁷ Lt Col Michael J. Kingsley, 20th Special Operations Squadron Commander, interviewed by author, 17 December 2001. Currency requirements are periodic training events necessary to maintain proficiency.

⁵⁸ Ibid.

Chapter 3

FUTURE STRATEGIC ENVIRONMENT

If you do not think about the future, you cannot have one.

John Galsworth, “Swan Song”

Our nation creates force structure plans to meet future strategic environment forecasts. This environment cannot be completely predictable. But there are certain elements of the future that are reasonably expected, and with targeted preparations for this future the strategist can shape the environment in a manner most advantageous to US goals and interests. In the United States military this has been seen recently as a change from a “threat-based” strategy to a “capabilities-based” strategy. The Soviet Union is no longer the predictable foe we need to prepare against. We now focus on key capabilities we feel will be necessary to counter regional dangers, asymmetric challenges, and international lawlessness as described in our strategic guidance.

For the purpose of this paper the strategic environment for evaluation will be in the years 2007-2012. This environment is a balance between accurate prediction (prediction accuracy decreases as time increases) and ability to affect change (near term change is more difficult to achieve with the slowness of our bureaucracy). This period is an estimate of the soonest time that can be accurately predicted with the ability to influence operational, material, and regulatory changes to our military system.

While the focus of this paper is on the handling of aerial refueling requirements for SOCOM assets, the environmental evaluation will not be limited to current SOF specific areas. The past ten years has shown an increased use of SOF in warfare, and the future will almost definitely be no different. “SOF will continue to play fundamental, critical roles in each of the three strategic components (peacetime engagement, deterrence and conflict prevention, and fight and win) of today’s National Military Strategy.”¹ These roles can be predicted from evaluating trends consistent within the nation’s various

¹ General Henry H Shelton, U.S. Army, USSOCOM Commander in Chief, “SOF Vision 2020.” USSOCOM, undated, 11.

strategic guidance documents. USSOCOM faces an operational environment exemplified by “accelerating geopolitical change, rapid technological advancement, evolving threats, constrained resources, and potential new roles.”²

Strategic Guidance

The primary (unclassified) evidence for this strategic evaluation comes from five sources. These include the National Security Strategy (Dec 1999), the National Military Strategy (1997), the Quadrennial Defense Review Report (Sep 2001), Joint Vision 2020 (June 2000), and the SOF Vision 2020 (undated, but followed JV 2020). The National Security Strategy (NSS) outlines America’s three central goals: enhancing our security with military forces that are ready to fight and win, bolstering American economic revitalization, and promoting democracy abroad. The Chairman, Joint Chiefs of Staff, formulated the National Military Strategy (NMS) of “shaping the international environment, responding to the full spectrum of crisis, while preparing for an uncertain future (Shape, Respond, Prepare)” to help achieve these goals.³ The NMS describes how the military capabilities of the US Armed Forces are used to support the NSS over the next three to five years. The Quadrennial Defense Review (QDR), signed by the Secretary of Defense, dictates America’s strategy for defense by identifying key changes required to preserve America’s safety and security given the predicted future security environment. Joint Vision 2020 and SOF Vision 2020 serve as conceptual templates for the conduct of future Joint and SOF operations. They are more specific than the NMS and QDR in the application of force in support of national objectives. A graphical depiction of the flow of strategy-to-task guidance used by the strategist to make force projections was presented in Figure 1.

Projected International Security Environment

During the Cold War, most nations allied with either the Soviet Union or the United States in a bipolar conflict. The fall of communism and the end of the Cold War

² General Peter J. Schoomaker, U.S. Army, USSOCOM Commander in Chief, “The Way Ahead,” (unpublished paper, December 1997), 5.

³ General John M. Shalikashvili, U.S. Army, Chairman, Joint Chiefs of Staff, *National Military Strategy: Shape, Respond, Prepare Now – A Military Strategy for a New Era*. 1997. Available from <http://www.dtic.mil/jcs/nms/>.

brought about sweeping changes in the way our nation and the US Air Force fights wars. “The bipolar conflict has been replaced by a continuous and global war of information and self interests.”⁴ We were prepared to fight a global battle against a Soviet block in either the nuclear or non-nuclear arena. Now, we are faced with many unknowns.

Because of this shift in the strategic order of nations, our national security strategy changed from a threat-based model (against the Soviet bloc) to a capabilities-based model. We now need “to identify capabilities that US military forces will need to deter and defeat adversaries who will rely on surprise, deception, and asymmetric warfare to achieve their objectives.”⁵ Although it is nearly impossible to accurately predict the future, it is possible to identify trends. As Secretary of Defense Donald Rumsfeld stated, “We can be clear about trends, but uncertain about events.”⁶ The first step is to identify these trends. From there we can develop capabilities for the long-range planning process.

There are three trends of the world of 2010 that the nation’s strategic guidance is in agreement about. These involve globalization, the US’s continued reliance on high technology, and the maintenance of a leadership position among the other global participants. First is the impact of globalization, or “the process of accelerating economic, technological, cultural, and political integration in bringing citizens from all continents together.”⁷ The world will become more and more interconnected among nations as we continue to find that our own well-being is dependent on the that of other nations far away. The US “will continue to have global interests” and those we interact with will become increasingly reliant on unimpeded access to the US economy, goods, and services.⁸

A second trend closely related to globalization is technology explosion. “Military power will be supplanted by economic and technical power as the key elements with which nations seek to attain political objectives.”⁹ The rapid pace of technology will

⁴ Provide Mobility in Denied Territory Mission Area Plan” *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 4.

⁵ Donald H. Rumsfeld, *Quadrennial Defense Review*, 30 September 2001, 14.

⁶ Ibid, iii.

⁷ *A National Security Strategy for a New Century*. The White House, December, 1999. Available from <http://usinfo.state.gov/regional/ar/natsec2k.htm>, 4.

⁸ *Joint Vision 2020*. Washington DC: US Government Printing Office, June 2000, 5.

⁹ “SOF Mobility AFSOF 2030 Mission Area Plan,” *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 26.

continue and spread to other countries. Our potential adversaries will have access to the global commercial industry base and much of the same technology as the US military. This will cut into our technological lead and increase the number of potential adversaries and the lethality of their capabilities.

A third trend is that the US will continue to have an interest as a global leader. “The US must lead abroad if we are to be secure at home.”¹⁰ While there are many unknowns in the uncertain future strategic environment, we have the ability to guide the path of the rest of the world towards one advantageous to US interests. Our three core objectives of “enhancing American security, bolstering economic prosperity, and promoting democracy and human rights abroad” will each be more easily accomplished with the US driving world events rather than responding to them.¹¹

Future Emerging Threats

The evolution of the strategic environment from a bipolar world to a unipolar world with the United States as hegemon closely tied to a globalizing environment has not brought about peace and stability. The strategic environment remains a complex and potentially dangerous place. While we are not confronted by a peer competitor, and are not likely to be in the near future, “regional conflict remains possible, proliferation of weapons of mass destruction (WMD) is a major concern, and we face a number of nontraditional, transnational, and unpredictable threats to our security.”¹² The NMS identifies these threats as “regional dangers, asymmetric challenges, and wild cards.”¹³ These threats include the proliferation of WMD, subversion, terrorism, global environmental degradation, illegal drugs, information-based warfare, and other challenges to international stability and prosperity.

The regional dangers include what President George W. Bush has called “the axis of evil.” These include the countries of Iraq, Iran, and North Korea. Each of these countries has poor ties to the US, a non-cooperative government, and the possibility of

¹⁰ *A National Security Strategy for a New Century*. The White House, December, 1999. Available from <http://usinfo.state.gov/regional/ar/natsec2k.htm>, 7.

¹¹ *Ibid*, 7.

¹² General John M. Shalikashvili, U.S. Army, Chairman, Joint Chiefs of Staff, *National Military Strategy: Shape, Respond, Prepare Now – A Military Strategy for a New Era*. 1997. Available from <http://www.dtic.mil/jcs/nms/>, 5.

¹³ *Ibid*.

unleashing WMD on the United States or its allies. While these regional nations pose a threat to US interests, they represent a traditional challenge we are prepared for as they have national boundaries, dedicated militaries, established government, and definable vulnerabilities. The JMA process is designed to target these types of adversaries.

Recently an amorphous enemy has risen to threatening level as represented by non-state actors such as terrorists, irredentists, transnational organizations, criminal organizations, narco-traffickers, and multinational corporations, which have increasingly begun to plan a larger role in world politics. “Although they may not pose a strategic threat to the US, many can seriously threaten US interests in a limited time and place.”¹⁴ And after September 11th, 2001, this group may even be seen as posing a strategic threat to the US. “Terrorists, criminal groups, and multinational entities will seek to influence world events by threatening to employ unconventional methods or weapons that give them a disproportionate leverage to achieve their goals.”¹⁵ This opponent acts as a Lunaan hydra: if you cut off on head, two grow back.

SOF doctrine refers to this type of adversary as a “streetfighter” adversary. He fights outside the normal boundaries of conventional battle by refusing to adhere to rules while relying on the US sense of fair play.¹⁶ This adversary may have access to WMD and must be taken seriously. Because such enemy may rely on asymmetric means to attack and hide within many countries’ borders, they weaken the way America fights by creating anti-access and area denial problems. We must find a way to rid the world of it other than a direct attack on its Lunaan head.

Evolving National Military Strategy

To counteract this new enemy the most recent (1997) National Military Strategy (NMS) devised an approach called “Shape, Respond, Prepare Now – A Military Strategy for a New Era.” It states that we should prepare now, by shaping the international environment, in order to respond effectively to future threats. This NMS is based on the prediction that the United States will continue to deploy its armed forces globally and

¹⁴ General Henry H Shelton, U.S. Army, USSOCOM Commander in Chief, “SOF Vision 2020.” USSOCOM, undated, 5.

¹⁵ Ibid, 6.

¹⁶ Provide Mobility in Denied Territory Mission Area Plan” *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 8.

will remain engaged to influence the shaping of the global environment, creating favorable conditions for US interests and global security. The fundamental objectives of America's armed forces will remain unchanged: "to deter aggression, and should deterrence fail, to defend the Nations' vital interests against any potential foe."¹⁷ But we must make changes to deal with regional threats and the "streetfighter" adversary, which has become an increasingly potent threat.

The core ideas within the evolving NMS include three broad topics. They include dealing with regional threats, new strategies to effectively defeat terrorists, and capabilities that need further emphasis to deal with these threats. The first concept is additional guidance on dealing with regional actors in the future. Stopping the proliferation of WMD is a key idea within this concept. We must work proactively to slow the spread of WMD technology (regional and transnational). We must possess the capability to "find, track, and neutralize an adversary's WMD capability."¹⁸

We also need to increase the speed with which we are able to respond to regional crises. We need "to be rapidly deployable with a forcible entry capability to combat anti-access and area denial threats."¹⁹ In the Air Force, this concept is to be handled by an idea entitled "Global Strike Task Force," (GSTF) which will be explained in greater detail shortly. Added to this requirement is the need to increase the capability of forward deployed forces. In the future we will need to be smaller, faster, and more lethal, all at the same time.

The second core concept in the evolving NMS involves dealing with transnational lawlessness and terrorism. These include both non-lethal and lethal means. In the future there will be "an increased use of non-lethal force as the US public becomes less tolerant of both military and civilian casualties."²⁰ There will be increasing political pressure to just stop the enemy and bring them to justice, instead of using lethal force against them. This can be seen presently with the apprehension of the *al Qaeda* network terrorists and intent to bring them to trial, rather than just rid the world of them. These terrorist

¹⁷ Provide Mobility in Denied Territory Mission Area Plan" *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 4.

¹⁸ General Henry H Shelton, U.S. Army, USSOCOM Commander in Chief, "SOF Vision 2020." USSOCOM, undated, 6.

¹⁹ Donald H. Rumsfeld, *Quadrennial Defense Review*, 30 September 2001, 20.

²⁰ Provide Mobility in Denied Territory Mission Area Plan" *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 10.

organizations present WMD and anti-access problems that will challenge US forces. Our NMS states that we will meet these threats through integrated ISR capabilities and global access programs. One such program is known as Global Strike Task Force. It is designed to allow US forces to “find, fix, assess, track, target, and engage anything of military significance, anywhere in the world.”²¹

Global Strike Task Force

Global Strike Task Force (GSTF) is the concept, initiated by General John R. Jumper, Air Force Chief of Staff, which “empowers [the USAF] to overcome range barriers by providing the means to rapidly roll back adversary threats” anywhere in the world.²² It is designed to be the Air Force’s contribution to the nation’s “kick-down-the-door force” to tackle the anti-access problems future adversaries impose on the way we fight. GSTF is the Chief’s concept to deal with the difficulties presented by regional threats, asymmetric challenges, and wild card streetfighter adversaries.

The principal ingredients of Global Strike Task Force are stealthy, long-range, high-firepower assets with precision-guided munitions that go well beyond current capabilities. This includes F-22 and B-2 aircraft flying anywhere in the world with the support of aerial refueling. “GSTF is a rapid-reaction, leading-edge, power-projection capability that will deliver massive around-the-clock firepower.”²³ It will mass effects early, providing maximum shock during the first stages of a battle, delivering a sharp blow to bring about capitulation. According to General Jumper, “GSTF is an elegant and effective near-term strategy to meet the challenges facing America.”²⁴ It will be up to all components within the Air Force to support the GSTF strategy.

SOF Future Support

Although USSOCOM is not a direct participant in GSTF, they are a capable force of choice to complement the GSTF strategy. “SOF, because of their unique skills,

²¹ *America’s Air Force Vision 2020, Global Vigilance, Reach & Power*, US Air Force, 2000, available from <http://www.af.mil/vision/vision.pdf>, 8.

²² General John R. Jumper, USAF, “Global Strike Task Force: A Transforming Concept, Forged by Experience.” *Aerospace Power Journal* 15, no. 1 (Spring 2001): 29.

²³ *Ibid.*, 32.

²⁴ *Ibid.*

regional expertise, cultural sensitivity, and operational expertise, may be the force of choice for meeting the strategic requirements of the NCA [President or Secretary of Defense] or regional decisionmakers.”²⁵ SOF will support the evolving NMS and GSTF concept with the ability to defeat the “streetfighter” adversary and overcome anti-access problems through three interlinked capabilities. These include the ability to employ while deploying using a surgical strike capacity with an unrestricted range. SOF will accomplish this by adapting to emerging technology and threats to maintain full spectrum dominance. One attribute of SOF is that they have the characteristics of one of our future precision guided munitions (PGMs).

The Quadrennial Defense Review suggests that Special Operations Forces will need to be “immediately deployable and employable” to pinpoint locations around the globe to meet future demands of the changing security environment.²⁶ This is mainly due to the drastic reduction in US Forces based overseas. We now need the capability to self-deploy directly into a “hotspot” and be ready to fight when we get there. The enemy will try to deny us this potential through anti-access strategies. SOF will need to “be able to deploy immediately and discretely to flashpoints in adequate time to organize coalition efforts for relief or combat.”²⁷

The “deploy while employing” strategy leads to the GSTF requirement for a surgical strike capability. SOF is quite often the force of choice for deep insertions to defeat the “streetfighter” adversary. The past ten years worth of conflicts has demonstrated this with the use of SOF insertions everywhere from Operation DESERT STORM to Operation ENDURING FREEDOM. The QDR specifically highlights SOF’s capability to conduct deep insertions over great distances as a key contribution to enhancing US strategic and operational agility.²⁸ According to Lt Col Scott Howell, Chief of Strategic Plans at AFSOC, the primary mission for SOF forces in the years 2010 through 2015 will be “to go deep with precision accuracy.”²⁹

²⁵ General Peter J. Schoomaker, U.S. Army, USSOCOM Commander in Chief, “Posture Statement 2000,” *United States Special Operations Forces*. USSOCOM, 2000, 33.

²⁶ Donald H. Rumsfeld, *Quadrennial Defense Review*, 30 September 2001, 26.

²⁷ General Henry H. Shelton, U.S. Army, USSOCOM Commander in Chief, “SOF Vision 2020.” USSOCOM, undated, 15.

²⁸ Rumsfeld, 44.

²⁹ Lt Col Scott L. Howell, Chief of Strategic Plans, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 27 November 2001.

The “go deep” capability will require the use of aerial refueling to meet the unrestricted range requirement. SOF depends on this capability, and with the increased potential use of SOF forces, this quality needs to be enhanced. According to the AFSOC Vice-Commander, Brigadier General Richard Comer, “we will be unable to prosecute SOF operations in the future without a robust aerial refueling [AR] capability.”³⁰ This idea was further highlighted by the AFSOC 16th Special Operations Wing Commander, Colonel Lyle Koenig who stated, “Reliance on AR in combat will exponentially increase.”³¹ This need is also on the top of the Air Force Special Operations Forces modernization plans’ requirements list. In the AFSOF 2030 Modernization Plan the top mobility need (and number two overall need) is stated as “unrestricted range.”³² This position is further emphasized by the Air Force Modernization Plan “Provide Mobility in Denied Territory” which states that one of the mission execution deficiencies is the “low number of helo tankers available.”³³ Aerial refueling is a capability that is critical to the success of future SOF operations, and SOF is critical to combating the emerging threats of the future international security environment.

The Background

The future we will encounter is not clear. However, some aspects of today’s world environment will be a part of the future: globalization, reliance on high technology and unmanned vehicles, and the use of precision weapons. Our military will rely on SOF and mainstream airpower operating synergistically and quickly in the deep battlespace to defeat anti-access threats in order to maximize “the ‘time value of war’ which requires a rapid victory to reduce the potential for casualties and the erosion of public support for operations.”³⁴ The US will maintain its worldwide leadership interests and will persist in its fight against the proliferation of WMD.

³⁰ Brig Gen Richard L. Comer, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001

³¹ Colonel Lyle M. Koenig, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

³² Howell, Scott L. “FY 04-29 Mobilization Plan AFSOF 2030.” lecture, Hurlburt AFB, FL., 17 December 2001, slide 54.

³³ “Provide Mobility in Denied Territory Mission Area Plan” *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 28.

³⁴ “Provide Mobility in Denied Territory Mission Area Plan” *Air Force Modernization Plan*. HQ AFSOC/XPP, 3 October 1995, 11.

In this international security environment, with the emerging threats and evolving National Security Strategy, there will be a continued reliance on special operations to “fulfill unique global responsibilities ranging from peacetime engagement to fight and win.”³⁵ In a volatile and uncertain world the US military will rely on SOF to cross anti-access borders with unlimited range capabilities in order to strike deep against a regional threat, WMD hazard, or “streetfighter” adversary. The nation will continue to rely on SOF and SOF will continue to rely on vertical-lift aircraft (helicopters and CV-22) and aerial refueling. In a world of increased global interaction SOF will be a unique mechanism for extending US influence, ideals and values.

So where is the argument so far? Chapter two provided a historiographic timeline for the evolution of special operations. The Air Commandos have progressed from unconventional and counterinsurgency operations to direct action and deep strike capabilities in current use. Helicopter aerial refueling has moved from a limited use force enhancement for Rescue operations to a requirement for SOF operations. This critical capability has been stretched to its limits to the point at which every Reserve squadron available has been activated with no end in sight. Still there is disagreement about whether additional forces are needed to perform the aerial refueling mission.

While the future strategic environment remains unknown, there are certain trends that are fairly predictable from current operations. Technology will continue to advance, our adversaries will increasingly present anti-access problems for our military, and SOF will complement the Global Strike Task Force strategy for deep insertion operations. Chapter three highlighted numerous capabilities that will be needed to counteract the emerging threat to national security. These included the need for being able to employ while deploying and the need for a surgical strike capability. These operations will rely on helicopter aerial refueling to be accomplished. This is a capability that is not in decline and “will exponentially increase in the future.”³⁶

The question now is how SOCOM and AFSOC plan to meet the needs of the future. This question is the focal point for the remainder of this paper. The next chapter

³⁵ General Henry H Shelton, U.S. Army, USSOCOM Commander in Chief, “SOF Vision 2020.” USSOCOM, undated, 25.

³⁶ Colonel Lyle M. Koenig, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

will focus on providing an overview of the future SOF aviation forces. Chapters five and six will then evaluate whether or not this vision meets the needs of the predicted environment. While the political environment drives military needs, it is yet to be determined if the military plan will satisfy these needs.

Chapter 4

FUTURE SOF AVIATION FORCE STRUCTURE

*No nation ever had an army large enough
to guarantee it against attack in time of peace
or insure it victory in time of war.*

Calvin Coolidge

The projected security environment in the 2007 to 2012 period presents multiple challenges for the United States' interests and security. United States Special Operations Command (USSOCOM) has a plan to proactively respond to this environment with a combination of organizational, technological, and materiel changes to provide the capabilities to meet emerging threats. USSOCOM vision "incorporates quality people with unequaled skills and a broad based technological edge to ensure tomorrow's SOF are structured, trained, and equipped to counter diverse threats to our national security."¹

The previous chapter provided an analysis of the projected security environment that future SOF will have to operate within. This chapter will provide an outline on just how USSOCOM, and the aerial refueling platforms in particular, plan to meet the challenges. I will first describe the strategic needs that SOF will be required to fulfill, and then provide a description of the SOCOM and AFSOC long-range plan for meeting these needs. The SOF roadmap proposes mission area plans to meet the mobility demands required in the future strategic environment. The application of force through SOF aviation, supported by refueling platforms, is one key to special operations shaping the future battlefield. Lastly, the aviation assets and refueling platform vision of the future will be explained to set the stage for an analysis of the plan in chapter five.

Strategic Needs

Chapter three provided an overview of the projected security environment as seen from the author's point of view through various documents. This environment dictated

¹ Shelton, Henry H., General, USA, USSOCOM Commander in Chief, "SOF Vision 2020." USSOCOM, undated, 1.

needs for special operations to meet in the future. I will classify these into three broad categories as agility, flexibility, and range. Within each are required traits to meet the need of that category. The first category is agility.

Agility requires speed and focus. In the future, much as today, SOF will need to rapidly exploit enemy vulnerabilities. The decision cycle continues to shrink as our enemies acquire the means and intelligence to respond to our actions. We will need forces that are “immediately deployable and employable,” postured for action on a moment’s notice.² Information such as terrorist cell locations is time-sensitive and requires instant attention. The “focus” portion of agility requires precision employment techniques. We will have to exploit SOF as a PGM to counter the threat with minimal collateral damage. Our constraints include not only low allied and noncombatant casualties, but also minimal enemy casualties and damage to their infrastructure. We will also need SOF precision to “find, track, and neutralize an adversary’s WMD capability.”³ This mission requires perfect performance to avoid possible catastrophic damage or unacceptable loss of life. SOF forces will need speed and precision to counter tomorrow’s “streetfighter” and wild card adversarial force.

Secondly, SOF will need to maintain flexibility in future operations. The limited information on an adversary means SOF will need to be postured to exploit a variety of avenues of attack. These may include direct attacks, long-range infiltration or exfiltration of personnel, or the insertion of advisors to minimize the effects of an escalating situation in a third world country. This flexibility will enable special operations to be the human complementary element to General Jumper’s Global Strike Task Force.

The necessity for agility and flexibility leads to the third required trait of unlimited range for future operations. Our enemies will present anti-access problems that will limit deployment locations and access routes. We will need to be able to maneuver as necessary to employ SOF to objective areas in the deep battlespace. Flexible route planning for threat avoidance will be paramount to maintain the safety and improve the chance for success of the low-altitude, non-stealthy SOF assets. Agility, flexibility, and

² Rumsfeld, Donald H., *Quadrennial Defense Review*, 30 September 2001, 26.

³ Shelton, 6.

range together lead to the concept of “unrestricted mobility,” or “mobility in denied territory” within the context of the proposed environment.

Long Range Plan

Both USSOCOM and AFSOC have plans for the application of SOF power in the future, up through the year 2030 in order to meet strategic needs. The AFSOC plan supports the USSOCOM plans. As explained in chapter 1, this process is accomplished within USSOCOM through the Air Force Modernization Planning process using the Joint Mission Assessment (JMA) methodology “to assist in decision making for the Command’s Strategic Planning Process.”⁴ The JMA looks at short to mid-term goals and needs of special operations. The SOCOM Future Concepts Working Group looks at a longer range (over 20 years) and develops a strategy to task plan, from the National Security Strategy, the National Military Strategy, and Joint Vision 2020, while evaluating future threats. Their results are contained in documents labeled “Roadmaps.”

USSOCOM Roadmaps describe long-range needs through technology innovation, professional development, and proactive acquisition.⁵ In the technology field they plan to “look to emerging, leading-edge technologies in such areas as mobility, sensing and identification, miniaturization, secure communications, advanced munitions, stealth, human enhancements, and robotics to increase the efficiency and effectiveness of [their] people and platforms.”⁶ In the professional development field USSOCOM plans to provide training using virtual reality and educate their operators balancing generalist and specialist skills. And in the proactive acquisition category, USSOCOM plans to “integrate proven commercial-off-the-shelf (COTS) components or subsystems in new ways to provide capabilities unique to SOF.”⁷ The combination of developmental testing and COTS acquisition will provide the equipment necessary to accomplish future SOF missions.

⁴ “Special Operations Command SORR Assessments,” *Assessment Director (AD) Handbook*. USSOCOM/SORR, 2001, 137.

⁵ Shelton, Henry H., General, USA, USSOCOM Commander in Chief, “SOF Vision 2020.” USSOCOM, undated, 2.

⁶ Ibid, 21.

⁷ Ibid, 24.

To meet the needs of the future, SOF will perform three important roles in support of the National Security Strategy. These include Surgical Strike and Recovery, Special Reconnaissance, and Political-Military operations.⁸ The Surgical Strike and Recovery missions will range from hostage rescue to preventing terrorist use of WMD. The Special Reconnaissance missions will provide the “on the ground” truth. And the Political-Military operations, including Foreign Internal Defense, Psychological Operations, Civil Affairs, and Humanitarian Assistance, will work the key middleman problems involved in military operations other than war (MOOTW).

To support proposed USSOCOM future concepts, AFSOC has devised five mission areas for planning (MAPs). These include SOF Mobility, Information Operations, Precision Employment/Strike, Shaping the Battlefield, and SOF Agile Combat Support.⁹ SOF Mobility is the primary contributor of AFSOF to USSOCOM. AFSOC provides the infiltration and exfiltration of SOF ground personnel and their equipment. Future upgrades will be covered in the next section on aircraft. Information operations (IO) includes EC-130E, EC-130J aircraft and MC-130s accomplishing leaflet drops in order to support the IO plan. Improvements in this area include the crossdecking of EC-130Es to EC-130J aircraft, the introduction of an audio voice translator, and a special operations video editing system.¹⁰

Precision Employment/Strike assets include AC-130H and AC-130U aircraft and the special tactics teams on the ground supporting SOF direct action missions. Future upgrades include fire control system upgrades, a guided 105mm projectile, a towed decoy system, improved engine infrared screens, and upgrades to its All Light Level Television system.¹¹ The Shaping the Battlefield category includes combat aviation advisory teams and Foreign Internal Defense (FID) programs. Upcoming changes in this category to support SOF missions in the future include an aviation advisor career path, organizational

⁸ Schoomaker, Peter J., General, USA, USSOCOM Commander in Chief, “Posture Statement 2000,” *United States Special Operations Forces*. USSOCOM, 2000, 33-34.

⁹ “SOF Mobility AFSOF 2030 Mission Area Plan,” *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 1.

¹⁰ Howell, Scott L. “FY 04-29 Mobilization Plan AFSOF 2030.” lecture, Hurlburt AFB, FL., 17 December 2001.

¹¹ *Ibid.*

restructuring, introduction of an audio voice translator, and increased training in language, cultural awareness, and survival skills.¹²

The last category of plans is SOF Agile Combat Support. This includes the many support functions that complement the other categories. These are functions such as combat weather, civil engineering, communications, logistics, security forces, and space operations. Each function blends their improvements into the other MAPs. A complete list of the future improvements and proposed systems is contained in the *AFSOC Technology Roadmap*, Edition 5, June 1999, Section 2, and Appendix C of the 2000 *US Special Operations Forces Posture Statement*. This was just a short overview and lead-in to upgrades and changes in aviation assets, in particular aerial refueling assets, which support the overall mission of USSOCOM.

Aviation Assets

USSOCOM is a multifaceted command with the goal of prosecuting special operations missions in support of national policies, by order of the President or Secretary of Defense. As the future security environment showed, the difficulties in the future will be in obtaining access to areas of concern to accomplish these missions. It is the mission of the mobility field within USSOCOM to provide aerial access to these locations. "Aircraft mobility is an essential requirement if SOF are to carry out long-range missions in a timely manner."¹³ Agility, precision, and flexibility are the keys, and mobility and range is the answer. The future of these mobility assets show the AFSOC and SOCOM vision for providing SOF mobility in denied territory to overcome the threat and accomplish the mission.

AFSOC fixed-wing aviation assets include the AC-130H and AC-130U aircraft in the Precision Employment/Strike category, the EC-130E and EC-130J aircraft in the Information Operations category, and the MC-130P, MC-130E, and MC-130H aircraft in the SOF Mobility category. This category includes aerial refueling of SOCOM helicopter assets. The refuelable helicopters include the MH-53J, MH-53M, MH-47D, MH-47E, MH-60K, and MH-60L aircraft. The MH-53s belong to the air force and the

¹² Ibid.

¹³ Keith Hutcheson, "AFSOC's Future Achilles Heel." *Armed Forces Journal International* 138, no. 7 (Feb 2001): 47.

MH-47s and MH-60s belong to the army. A future aircraft currently in the acquisition process is the CV-22 Osprey. A list of the proposed quantities of the SOF Mobility and refuelable vertical-lift assets is located below in Table 2. A description of each of these assets, as well as future planned upgrades and modification is contained in Appendix C.

Table 2
SOCOM POM Transition Plan

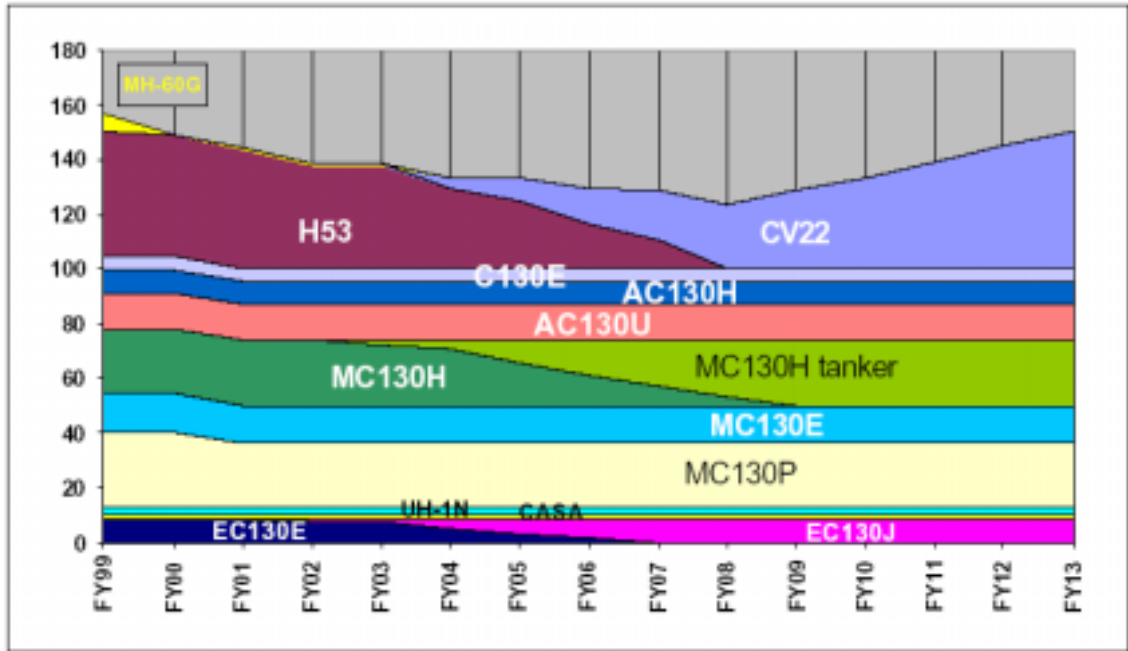
ASSET	Number of Assets			
	FY 2002	FY 2005	FY 2009	FY 2012
MC-130P	24	20	20	20
MC-130E	14	14	14*	14*
MC-130H	0	4	20	24
MH-53J/M	34	34	33	13
MH-47D/E (Army)	37	37+	37+	62
MH-60K/L (Army)	60	60+	60+	75
CV-22	0	0	21	41

* Number depends on results of tanker requirement studies such as this thesis. The plan was to remove the MC-130E from the fleet with the refueling modification to the MC-130H.

The (+) symbol represents force projections as presented in interviews, but not confirmed by written documentation ("planning on going towards 62 47s and 75 60s").

Sources: Ellis, David F., Lt Col, USAF, Assessment Officer for Fixed Wing Assessment Division, former 9th Special Operations Squadron Operations Officer, interviewed by author, 5 December 2001; and author's collation of published data. Numbers approximated from current figures and POM projections.

Graphically, the changes in AFSOC aircraft envisioned over the next ten years are presented in Figure 3 below. Figures for MH-53s do not correlate between the table and the figure as the delays in the CV-22 has slowed planned deactivation of the MH-53. The numbers in the chart are the most recent projections. This is the last time aircraft other than those associated with helicopter aerial refueling will be displayed. Other aviation assets were used to provide the context for helicopter refueling, which will be the focus of the remainder of this paper.



Source: "SOF Mobility AFSOF 2030 Mission Area Plan," *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 39.

Figure 3
AFSOC Force Structure

Refueling Capability

AFSOC's refueling capability resides within the Talon (MC-130E and MC-130H) and Shadow (MC-130P) aircraft and the future planning and organizational decisions that will influence the number and capabilities of the refueling assets. There are five major topics that will affect the force structure and capabilities of future AFSOC Mobility assets. These are the unknown quantity of refueling assets, the acquisition of the CV-22 Osprey, the unknown number of refuelable aircraft, the upcoming Avionics Modernization Program (AMP), and the Joint Mission Analysis (JMA) reports on refueling needs. Each of these will be explained for its effect on force structure in 2007 to 2012.

First is the unknown number of refueling assets. The number of MC-130E and MC-130P aircraft is hanging in the balance. With the implementation of aerial refueling pods on MC-130H aircraft, the MC-130E and MC-130P aircraft were going to be divested. The MC-130H refueling pods are supposed to start in 2003, and the MC-130P

aircraft would begin to retire.¹⁴ The MC-130E aircraft would not be far behind, beginning in 2006.¹⁵ These retirements were planned due to the average age of the assets exceeding 30 years. If they are not retired, they will need substantial improvements including outer wing replacements.¹⁶ Now, with the aircraft involved in operations around the world supporting the war on terrorism, all available aircraft are being employed. SOCOM is using every asset available, including reserve forces.¹⁷ These thirty-plus year old aircraft will not last forever, and there is no end in sight. Meanwhile there's controversy on whether or not to retire them.

The second topic affecting force structure is the introduction of the CV-22 Osprey. Originally scheduled to enter AFSOC inventories in 2003, the program has met the same fate as other high-technologies before it—an inevitable delay in operational implementation. It is now scheduled for introduction some time after FY 2006, and before 2013.¹⁸ The CV-22 is planned “to fulfill the need for a high-speed, long-range, vertical lift aircraft to conduct precise, low-visibility, penetrating missions transporting men and materiel deep into hostile or denied territory during a single period of darkness.”¹⁹ This is the solution to the failed hostage rescue attempt in Iran in 1980. The greatest advantage of the CV-22 over the current assets will be its “C-130-like range and speed and helicopter-like takeoff and landing capability.”²⁰

Another belief is that the CV-22 will require less aerial refueling than current assets due to its longer range. “The CV-22 will carry a greater fuel load providing greater range without refueling.”²¹ This will reduce the current drain on the aging fleet of aerial refueling tankers. With the acquisition of the CV-22 comes the divestiture of the MH-53J/M—again leading to a reduced aerial refueling requirement. This was confirmed

¹⁴ Ibid, iv.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

¹⁸ “SOF Mobility AFSOF 2030 Mission Area Plan,” *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 39.

¹⁹ Major General Charles R. Holland, USAF, Commander, United States Special Operations Command, “V-22 Osprey Program,” Senate Armed Services Committee, FDCH Congressional Testimony, 1 May 2001.

²⁰ Bill Gregory, “Family Business,” *Armed Forces Journal International* 138, no. 1 (Aug 2000): 12.

²¹ Major General Charles R. Holland, USAF, Commander, United States Special Operations Command, “V-22 Osprey Program,” Senate Armed Services Committee, FDCH Congressional Testimony, 1 May 2001.

by a 1999 Tanker Study by SOCOM/SORR, which determined that “the programmed tanker force is capable of providing required AR proficiency training for the programmed fleet of vertical lift aircraft.”²² The CV-22 should require less tanking and the JMA supports this finding by stating that AFSOC does not need any more tankers.²³

The third topic affecting refueling platforms in the 2007 to 2012 timeframe is the Avionics Modernization Program (AMP) and other modifications in store for the MC-130H, MC-130E, and MC-130P fleet in the upcoming years. The AMP program will take approximately five years to complete, currently planned between 2008 and 2012. The other modifications include adding Directed Infrared Countermeasures (DIRCM) equipment to the MC-130H and MC-130E aircraft between 2006 and 2015 and the Common Avionics Architecture for Penetration (CAAP) modification between 2008 and 2011.²⁴ Lastly, there is the center wing replacement for the MC-130H between 2007 and 2013.²⁵ These modifications will inevitably complicate any force-planning model and increase operational risk, as aircraft will be flowing into and out of upgrade programs that may slip as necessary on timetables.

The last topic is the unknown quantity of refueling assets. The army has increased the number of probed aircraft over 100 percent in the last ten years and may continue this trend without forecasts.²⁶ Recently I was told by a SOCOM Assessment Officer that the army refueling platforms would be increasing to 75 MH-60s and 62 MH-47s in the near future. They will inevitably continue to probe their aircraft as operations in Afghanistan have shown that ground-gassing in that environment destroys aircraft engines.²⁷ Added to the unknown army probes is the unknown quantity and flow of CV-22 operational capabilities. All of these topics together provide for a fog and friction refueling environment right out of Karl von Clausewitz’ *On War*.

²² Lt Col John C Buss, USA, and Maj Donald A. Gresham, USAF, “Structural Analysis of Peacetime Air Refueling (AR) Training Requirements,” (point paper, USSOCOM SORR-SCA, August 1999).

²³ Lt Col Scott L. Howell, USAF, Chief of Strategic Plans, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 27 November 2001.

²⁴ “SOF Mobility AFSOF 2030 Mission Area Plan,” *Air Force Modernization Planning*. HQ AFSOC/XPPX, September 2001, 69-73.

²⁵ Ibid.

²⁶ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

²⁷ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

The Plan

The 2007 to 2012 period promises continued opportunities for SOF operators to demonstrate their skills. Special Operations will need a combination of agile response, precision employment, and flexible plans to meet the needs of the strategic environment. The USSOCOM Modernization Plan provides roadmaps to meet long-range needs in its mission area plans through technology innovation, professional development, and proactive acquisition. This will enable them to perform the roles of surgical strike, special reconnaissance, and political-military operations in support of joint and combined military actions in support of political decisions. One key to these operations will be SOF mobility and the inherent aerial refueling capability.

The next five to ten years promises to be very dynamic with respect to aerial refueling assets. There will be an unknown number of refueling assets because of desires to retire legacy assets such as the MC-130E and MC-130P aircraft, a modification program involving refueling pods for the MC-130H aircraft, and all special operations aircraft undergoing AMP upgrades. The CV-22 program will continue to add unknowns to the process with developmental delays and controversy over its effect on the required number of tankers for support. Lastly, the AMP program will add additional unknowns as aircraft process through the upgrade program and receive differing upgrades affecting penetration capability. This dynamic environment will require careful force structure planning for successful navigation. It is the goal of the next chapter to analyze the proposed refueling force structure and the common beliefs within the planning process to determine if the assets will meet the strategic needs.

Chapter 5

ANALYSIS OF FORCE STRUCTURE

War is too serious a matter to be left to soldiers.

Georges Clemenceau

This chapter will focus on whether or not USSOCOM has made appropriate force structure decisions with respect to aerial refueling platforms (MC-130P, MC-130H, MC-130E) for the future strategic environment. The past has shown aerial refueling to be a critical enabler of special operations missions. The future demands increased reliance on AR due to anti-access problems and emerging threats. The SOCOM plan shows moderate increases in both tanker and vertical lift aircraft. The question is whether the plan will meet the needs.

Army and air force “decisions to increase their inventories of probed aircraft have not met with commensurate increases in tanker support for those aircraft.”¹ The planning process has become reactionary with the conversion of MC-130H Talon II aircraft to take on the additional role of helicopter aerial refueling. The big question now is whether or not plumbing the 24 Talon IIs (T-IIs) will be enough. The answer to this question will result in force composition changes with the possible retirement of the MC-130P and MC-130E aircraft. Added to this is the belief that the upcoming CV-22 aircraft will reduce overall AFSOC tanker requirements. We now must determine what really drives the tanker numbers for effective force structure planning in the years 2007 to 2012. Tankers are not “tip of the spear” assets—last minute reactionary planning will not bring them money to catch up.

This chapter will evaluate three factors relating to AFSOC tanker force structure. These are AFSOC and SOCOM forecasting for future needs, evaluations of the tanker capabilities, and a comparison to the realities and circumstances surrounding recent tanker operations. Each of these areas will add one more piece to the mosaic that forms

¹ “Air Force Special Operations Command Airlift-Tanker Study 2001,” HQ AFSOC XP Interoffice Report, 2001, 1.

the picture of USSOCOM mobility in denied territory. By the end we should have a better understanding of the future force structure requirements.

FORECASTING FUTURE NEEDS

There are four areas in the category of forecasting future needs that will be analyzed for their influences on the future tanker requirements. These are: the effects of AFSOC providing Combat Search and Rescue assets, how training affects force structure decisions, the result of modifying the 24 MC-130H Talon II aircraft to accomplish the refueling mission, and the influence the CV-22 will have on tanker requirements.

Combat Search and Rescue. According to SOF doctrine Combat Search and Rescue (CSAR) is a “collateral activity,” along with counter drug activities, humanitarian assistance, and security assistance, to name a few.² As such it is accomplished only when SOF unique capabilities are required, and it competes with other SOF priorities. As a collateral activity, it is not part of the JMA planning process. Within USSOCOM/SORR (Force Structure, Resources, and Strategic Assessment Center), where force structure decisions are made, “the Assessment Directors do not force structure for CSAR.”³ They look at the structure needed to meet the needs of two major theaters of war (MTW), homeland defense, the USSOCOM specific missions, contingencies, and then add risk to turn the Risk Evaluation Force (REF) into the Objective Force (OBJ Force). However, CSAR has been more than a collateral mission over the past ten years.⁴ During Operations DESERT STORM, DENY FLIGHT, DELIBERATE FORCE, ALLIED FORCE, PROVIDE COMFORT, NORTHERN WATCH, SOUTHERN WATCH, and ENDURING FREEDOM special operations assets have been the first choice to perform CSAR missions. SOF aircraft have the most robust capabilities and they have been called to perform this critical mission. A list of the numbers of assets used during these operations is contained below as Table 3. For a mission that is not resourced or planned

² Joint Publication 3-05, *Doctrine for Joint Special Operations*, 28 October 1992, 12.

³ Colonel Robert D. Richardson, USA, Chief, Maritime and Rotary Assessment Division of the Center for Force Structure, Resources, and Strategic Assessments, USSOCOM, interviewed by author, 5 December 2001.

⁴ Lt Col T. Tracey Goetz, USAF, HQ Air Force Special Operations Command (AFSOC) Plans (XPP), interviewed by author, 27 November 2001.

for, it seems strange that AFSOC has consistently dedicated assets. This has undoubtedly taken away from the other missions that USSOCOM is tasked to perform.

Table 3
SOCOM CSAR during Contingencies

Operation	SOCOM Tankers for CSAR	SOCOM Helicopters for CSAR
DESERT STORM	Over 12*	Over 21*
PROVIDE COMFORT	2 (rotating with Reserves)**	4 (rotating with Reserves)**
NORTHERN WATCH	2 (rotating with Reserves)**	4 (rotating with Reserves)**
SOUTHERN WATCH	2 (rotating with Reserves)**	4 (rotating with Reserves)**
DENY FLIGHT	1***	2***
DELIBERATE FORCE	2-4****	4-8****
ALLIED FORCE	2***	6***
ENDURING FREEDOM	4-8****	8-16****

Sources: * From interview with Col Joe Tyner, 16th OG/DO, 18 Dec 01, and his paper, “AF Rescue & AFSOF: Overcoming Past Rivalries for Combat Rescue Partnership Tomorrow.” (U.S. Navy Postgraduate School Research Report, 1998); ** From personal experience; *** From interview with Lt Col James C. Slife, MH-53 Pilot, 24 Apr 2002; **** From interview with Lt Col Brad Webb, 20th SOS/DO, 24 Apr 2002.

Training. A second area that is not forecast for force structure considerations is training requirements. In order for a combat aircrew to be prepared to accomplish their mission they must complete periodic training sorties and currency items. One of these currency items is helicopter aerial refueling. Both the helicopter and tanker crews must accomplish semi-annual “contacts” to maintain currency. Unfortunately, again the REF does not address peacetime aerial refueling (AR) requirements. The REF is all about maintaining the force required to fight and win our nations battles. “We can’t buy tankers to complete training requirements.”⁵

Added to this problem, there is no model to predict training requirements. The JMA uses Special Operations Force Analysis & Modeling Systems (SOFAMS) to make

⁵ Colonel William E. Osborne, USAF, Chief, Fixed Wing Assessment Division of the Center for Force Structure, Resources, and Strategic Assessments, USSOCOM, interviewed by author, 5 December 2001.

force predictions for combat, but there is no similar tool for predicting training requirements. There have been studies performed by different agencies within SOCOM, but as will be seen later in this chapter, they have been desultory and flawed in their assumptions leading to results satisfying the author's predetermined agenda.

Lastly, when training gets bogged down and the mission is unable to be completed in a realistic manner, USSOCOM ignores the difficulties. One recent area this showed up was in Forward Arming and Refueling Point (FARP) operations. In peacetime we tend to FARP on concrete pads.⁶ This leads to the opinion that FARP operations are easily accomplished and are as efficient as aerial refueling. However, when our aircraft tried to FARP in the Afghanistan desert the engines ingested so much sand and dust that operations were substantially affected.⁷ Also, when tanker aircraft are not available during training exercises, "lily pads suddenly appear."⁸ Aerial refueling is simulated and aircraft are ground-gassed instead. This works well for training over land. However this would be a huge problem in combat with unavailable tankers.

The manipulation of operations due to a lack of aerial refueling tankers has led to inappropriate opinions that FARP operations are as efficient as AR and that AR will always be there. The truth of the matter is that AR is not always there. As will be shown later in this chapter, combat operations are sometimes affected when there is a lack of tankers. This "support" asset has ended up limiting the operational pace of missions.

T-IIs as a Solution. One proposed solution to a shortage of tankers is to turn the MC-130H Talon II into a refueler. Plumbing of the 24 T-IIs will bring enough assets to accomplish all the AR SOCOM vertical lift assets require. Or so the thought goes. The reality of the situation is that the T-IIs will help, but they bring along problems of their own. These include their own operational tempo, their cultural mindset and their differences from MC-130P Shadows.

⁶ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

⁷ Ibid.

⁸ Lt Col T. Tracey Goetz, USAF, HQ Air Force Special Operations Command (AFSOC) Plans (XPP), interviewed by author, 27 November 2001.

First of all, the Talon IIs are “booked right now supporting USSOCOM components.”⁹ They have their own mission focusing on infiltration/exfiltration of special operations forces in denied territory. Their defensive systems suite makes them the most capable asset AFSOC has to penetrate into hostile territory. As such they are very busy transporting the “tip of the spear” SOCOM assets. They have their own training requirements that already keep them very busy supporting bilats (training between two units) and joint readiness exercises (JRX).¹⁰ Although the JMA considers all the T-IIs as potential refueling assets, they have other missions, which will take priority over refueling.

Secondly, they have great pride in the missions they currently perform. They consider themselves one of AFSOC’s leading forces and that aerial refueling is not their primary mission. “The cultural mindset of the T-IIs is not to refuel.”¹¹ They will undoubtedly resist change, seeking to maintain the types of missions they currently undertake. The complexity of their current missions has created a repertoire of skills that will lead to slow organizational change. Also, the leadership will be resistant to use them only as tankers since “we need to use all their talents” and “they are multifaceted tools,” according to the 16th SOW Wing Commander.¹²

Lastly, the T-IIs are not a one-for-one swap with the MC-130Ps as they are not capable of carrying as much fuel as a Shadow.¹³ The Shadow has a Benson tank in the fuselage that holds an extra 11,000 pounds of fuel. It is capable of holding two of these tanks. The Talons may be modified in the future to take an extra fuselage tank (or two) to be comparable with the Shadow, but this will be space inside the aircraft that would limit the other missions the MC-130H community are wed to. Overall, when one looks at the benefits of receiving 24 additional tankers, they must realize that they will not get the

⁹ Lt Col Albert H. Williams, USAF, 8th Special Operations Squadron Operations Officer, interviewed by author, 27 November 2001.

¹⁰ Ibid.

¹¹ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

¹² Colonel Lyle M. Koenig, USAF, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

¹³ Colonel Joe E. Tyner, USAF, Deputy Commander, 16th Operations Group and previous 9th SOS Squadron Commander (1993-1995), Hurlburt Field, FL, Interviewed by author, 18 December 2001.

use of all 24. The T-II aerial refueling modification is not the panacea solution to the tanker shortage.

CV-22s Reducing Requirements. The second proposed solution to tanker shortages resides in the benefits the acquisition of the CV-22 Osprey provides. Over the 2006 to 2013 timeframe the MH-53s will be replaced by 50 CV-22s. According to USSOCOM Commander, General Charles R. Holland testifying before Congress, “The CV-22 will carry a greater fuel load providing greater range without refueling.”¹⁴ Comparing the CV-22 to the MH-53 the Osprey will be able to travel 900 nautical miles (nm) in 3.8 hours on its internal maximum of 12,350 pounds of fuel. If auxiliary fuel tanks are included, the Osprey will be able to go 1,450nm in 6.3 hours on 20,150 pounds of fuel. Unfortunately in this configuration it only has 4 troop seats. This is compared to the 500nm the Pave Low can fly in 4.4 hours on 11,050 pounds of internal fuel.¹⁵ Either way it is easily seen that the Osprey can outdistance the Pave Low in less time on about the same amount of fuel.

This was a major reason for the CV-22 purchase—greater distance in a shorter amount of time. It is a result of the failed Iran Hostage operation in 1980. According to General Holland’s testimony, “had [the] CV-22 been available they could have accomplished the Operation EAGLE CLAW mission in eight hours with a considerably smaller force” (as opposed to the 35 hours required for the actual mission).¹⁶ General Holland went on to say, “Because of its enhanced speed and range, the CV-22 also requires fewer supporting aircraft. CV-22s conducting the Liberian NEO would require only five support/cargo sorties and three tankers, while the helicopters that actually conducted the NEO required 14 support/cargo sorties and two MC-130Ps for refueling.”¹⁷ This would have “required significantly less supporting aviation and expended

¹⁴Major General Charles R. Holland, USAF, Commander, United States Special Operations Command, “V-22 Osprey Program,” Senate Armed Services Committee, FDCH Congressional Testimony, 1 May 2001.

¹⁵ “Special Operations Aviation (SOA) Assumptions, Planning Factors, and Performance Data Guide.” *Joint Mission Analysis 2004-2009*. USSOCOM SORR, February 2001.

¹⁶ Ibid.

¹⁷ Ibid.

significantly less fuel.”¹⁸ That is less fuel for the support assets, not less fuel for the vertical lift assets. They actually require significantly more fuel.

This is the same for Operation EAGLE CLAW. While the CV-22s could conduct the mission in one period of darkness, they would overwhelm the refueling assets. This is because the refueling assets, which can normally provide gas to the helicopters, then go get gas themselves, before having to provide more gas to the helicopters, could never keep up with the Osprey. The benefit of its speed leads to the problem that it needs multiple assets for multiple refuelings. According to Lt Col Neil Billings, HQ AFSOC Deputy Director for Wing Plans and Programs, Operation EAGLE CLAW, if accomplished by CV-22s would require all of our tanker assets.”¹⁹

General Holland’s statements were supported by his staff in the CV-22 Program Office. When asked what the effect the CV-22 would have of aerial refueling assets, they responded with “the CV-22 will require significantly less AR than the MH-53. That was one of [their] top five requirements—less support needed for tankers.”²⁰ They went on to show the unrefueled range of the CV-22 to be a little over twice that of the MH-53. The program office said they had done a study showing the CV-22 required “around 60-70 percent less AR events” than the MH-53.²¹

There is no question that the CV-22 can out-distance the MH-53 if completing the same mission from the same base. But this new aircraft was not purchased to complete the same missions. It was purchased “to expand the ability to conduct our primary mission” and “increase mission capability.”²² It was designed to defeat the anti-access threat that would ground the MH-53s in the future. As such it will not use the same close bases the MH-53 currently use—it will base further from the threat. And that probe on the front of it will be one mechanism for defeating the anti-access threat. There will not

¹⁸ Ibid.

¹⁹ Lt Col Neil Billings, USAF, Deputy Director of Wing Plans and Programs, HQ AFSOC, interviewed by author, 21 February 2002.

²⁰ Maj Robert Howard, USAF, CV-22 Program Office, HQ AFSOC/XPQV, email response to author, 6 May 2002.

²¹ Ibid.

²² Major General Charles R. Holland, USAF, Commander, United States Special Operations Command, “V-22 Osprey Program,” Senate Armed Services Committee, FDCH Congressional Testimony, 1 May 2001.

be “60-70 percent less AR events.” The AR events will just occur further from the infiltration/exfiltration point.

Recently AFSOC has admitted that the CV-22 will actually require more tanker assets. In a HQ AFSOC message to HQ USAF/XP in Washington DC, the author stated, “we project that the 50 CV-22s scheduled to replace the current fleet of 36 MH-53s will require more AFSOC tankers.”²³ AFSOC is seeking additional support to acquire as many as 24 additional C-130s that can be converted to tanker aircraft. It seems that Lt Col Billings’ evaluation of the “fewer tanker requirement from CV-22” may have received notice leading to proposed force structure changes.

There are serious problems in the forecasting of tanker resources in the future. The mission of CSAR, which seems to dominate the AFSOC tanker and helicopter fleet, is unaccounted for in the forecasting process. Training problems go ignored and unrecognized, as they are also not a part of the formalized force structure forecasting process. When training issues do come up they are assumed away for efficiency purposes. While the Talon IIs will provide some relief to the overwhelmed tanker fleet, they are not the panacea solution as they have other missions that may or should take precedence over tanking operations. And the CV-22, while providing greater speed and range, will bring its own tanking problems requiring not fewer tankers, but quite possibly more. Next we will look at USSOCOM’s methods of evaluating tanker requirements.

Evaluating Capability

There are two areas within the “evaluating capability” realm that will be analyzed. These include a previous tanker study, “the SORR study” accomplished in 1999 to evaluate the tanker and vertical lift training requirements in peacetime, and the wartime Joint Mission Analysis (JMA) process as it relates to tanker assets. This covers both peacetime and wartime aspects of forecasting tanker requirements and force structure.

²³ “AFSOC Need for Additional C-130 Tankers,” HQ AFSOC Message R 082300Z Apr 02, Hurlburt Field, 8 Apr 2002.

SORR Report. In the mid to late 1990s AFSOC Operational Commanders began reporting that they were short of required tankers to meet mission requirements.²⁴ They began to argue that they could not even meet the training needs of AFSOC and SOCOM helicopters. It had “become more and more difficult to train personnel and keep the customer happy.”²⁵ With the JMA process showing that there were sufficient assets to meet wartime and contingency operations, the operators stressed the inability to meet training requirements and the lack of a method for evaluating training needs. In response, the member of USSOCOM Force Structure, Resources, and Strategic Assessments, Mission Analysis Division (SORR-SCA) evaluated the peacetime aerial refueling training requirements, from here-on called “the SORR report.”

The SORR report began by determining the number of hours on track the tankers needed to accomplish the training. It then determined the same number for the air force and army helicopters. The difference between the tankers and the helicopters (helicopters needed more time) was called the delta. The authors then determined that to satisfy everyone’s training requirements the tankers would just have to fly their requirements plus the delta. This required an additional 15-17 hours on track per month for the tanker squadron. While acknowledging that the actual number would be dependent on “maintenance and weather attrition factors,” their conclusion was “the peacetime utilization of one tanker aircraft does not justify additional force structure.”²⁶ These 15-17 hours were not even worth one aircraft. In the end, their recommendation was that the “analysis shows the programmed tanker force of 44 MC-130E/H/P aircraft is capable of providing required AR proficiency for the programmed fleet of 118 probed vertical lift aircraft (CV-22, MH-47D/E, MH-60K/L).”²⁷

Regrettably the SORR report is riddled with flaws. The first and most dramatic is the number of assets stipulated. As last chapter showed the actual numbers are very uncertain. Aircraft will be in modification, slow to come out of development, and some possibly on the chopping block. Even if programmed assets proceed as scheduled there

²⁴ History of the 16th Special Operations Wing, 1 Jan – 30 Jun 1995, K-WG-16-HI V.1 (Secret), in USAF Collection, AFHRA. Information extracted is unclassified, 64.

²⁵ Ibid.

²⁶ Lt Col John C Buss, USA, and Maj Donald A. Gresham, USAF, “Structural Analysis of Peacetime Air Refueling (AR) Training Requirements,” (point paper, USSOCOM SORR-SCA, August 1999).

²⁷ Ibid.

are already well in excess of 118 probed vertical lift assets, and this number may continue to grow. Also, the 44-tanker number is suspect. Presently there are approximately 38 tankers (possibly 37 if you do not count the one that crashed in Afghanistan). According to POM figures there will not be 44 tanker assets until around 2009, and then they will be in phase for the AMP upgrade.

Secondly, the SORR report made a substantial number of assumptions that may or may not prove to be valid. These include the weather conditions and maintenance capability of the aircraft. The weather in Florida can be unforgiving at certain times and the age of the aircraft is leading to a less than optimal maintenance performance. Add to this the many contingencies and operational taskings that the units are involved in and you have a situation where attaining the required track time for proficiency flying is suspect. The analysis was just too compartmentalized with a sterile contextual environment to be useful. Lastly, the report findings did not even come close to matching actual results. In 1999 only 74 percent of tanker requests went accomplished.²⁸ The rest were “unsupported.” It does not seem likely that the conclusion of the SORR report, that AFSOC has the required forces to conduct proficiency training, is valid if only 74 percent of the training is fulfilled.

Joint Mission Analysis. As described in chapter 1, USSOCOM uses the Joint Mission Analysis (JMA) process to forecast future aviation asset requirements to meet wartime and contingency operations. The process looks at possible future threats (Illustrative Planning Scenarios) and plans for the application of USSOCOM assets to meet Joint Force Commander (JFC) needs. At first look I was not a fan of the JMA. It seemed too artificial and Jominian²⁹ to be applicable to flexible process used to employ airpower. However, after an in-depth analysis of the process (and a trip to SOCOM to learn more about it), I am more supportive of it. The JMA is part science and part art, combined at the strategic level by a group of Assessment Directors who ultimately make decisions affecting USSOCOM force structures. While supportive of the process, there are areas for improvement.

²⁸ Maj Charles H. Meyers, USAF, USSOCOM, Assessment Officer for Fixed Wing Assessment Division, interviewed by author, 5 Dec 2001.

²⁹ Jominian refers to a set of principles, that if followed rigorously, would lead to success (Henri Jomini).

The science portion of the process is the modeling procedures used to come up with the Risk Evaluation Force (REF). This is called the Special Operations Forces Analysis and Modeling System (SOFAMS) and is driven by assumptions. If the assumptions are changed, the outcome is changed. The Analysis Branch of the USSOCOM Force Structure, Resources, and Strategic Assessment Center (SORR-SCA) is responsible for “developing a fully resourced REF through a quantitative Joint Mission Analysis of SOF mission area requirements as provided by the Defense Planning Guidance based on SOF Illustrative Planning Scenarios (IPS).”³⁰

The main problem with the process was in its assumptions. Many of them seemed unrealistic. One example is that the scenario does not take into account maintenance rates of the aircraft. With the age of the assets, this assumption leads to an over-estimation of results. Secondly, the altitude of the aircraft is not an input into the process. Altitude above ground (AGL) is, but what if the ground is 10,000 feet? Fuel burn rates would be significantly affected, and as witnessed in Afghanistan, helicopter performance would be pushed to its limits. A final criticism of the process is the lack of attritional modeling. Missions are always assumed to be successful with no losses. As operations in OEF have shown, even in a fairly benign environment there will be attrition.³¹

While there are problems with the “scientific” portion of the JMA, there is still an “art” portion, which is very robust. The Assessment Directors (ADs), the real keys to the process, add their “military genius” to the system to turn the REF numbers into an OBJ Force. They use their “seasoned military judgment” to “note deficiencies, and recommend suitable, feasible, and acceptable solutions to those deficiencies; seeking to optimize resource expenditures and improve combat capability.”³² Their main function is to add risk to the scientific process.³³ Overall, the result of the JMA rests on their backs.

³⁰ “Special Operations Command SORR Assessments,” *Assessment Director (AD) Handbook*. USSOCOM/SORR, 2001, 46.

³¹ According to AFSOC Vice-Commander Brigadier General Richard L. Comer there are helicopters that will not return from damage, and on 13 February 2002 the 16th SOW lost a MC-130P in a crash in Afghanistan.

³² “Special Operations Command SORR Assessments,” *Assessment Director (AD) Handbook*. USSOCOM/SORR, 2001, 12.

³³ Colonel Robert D. Richardson, USA, Chief, Maritime and Rotary Assessment Division of the Center for Force Structure, Resources, and Strategic Assessments, USSOCOM, interviewed by author, 5 December 2001.

The JMA process as a whole is fairly sound. The top-down strategy-to-task model provides changes and constraints in doctrine, training, organization, materiel, strategy, and policy. The changes that are needed are within the assumptions and application of the REF. These assumptions must be reevaluated with a “reality check” to ensure their continued applicability. Additional assumptions should be incorporated as noted above.

Effective Reality

As compared to the forecasts and evaluation techniques used to make force structure decisions for the future, the reality is different. It is a picture of high non-support rates, aging aircraft, a reactive army, and a drastic increase in the number of probed assets. All of these suggest severe deficiencies in force structure for aerial refueling operations.

Non-Support Rates. The operational pace of aerial refueling is overwhelming. In researching the tanker commitments, almost every interviewee stated that there were not enough tankers to meet current demand. When asked for evidence of this I received the comments that “there was no real paper trail when AFSOC turns down tanker requests.”³⁴ But these requests must be processed through some entity—the 16th Operations Group (16th OG) Current Ops. Upon further review I found a Current Ops representative to discuss tanker requests. She stated that they “don’t really have good data on how often missions go unsupported from the wing.”³⁵ Many of the requests come in by voice and they “just move on” when they cannot support the requests. The 16th OG Current Ops is a busy place and they do not have time to get bogged down with recording statistics.

One place they do like statistics though is the 16th OG Local Area Network (LAN) office. There they track all requests and flights for the wing. Evaluating the period of 1 Jan 2001 to 28 Feb 2002 I found that the wing was only able to support 111 of

³⁴ Lt Col Neil Billings, USAF, Deputy Director of Wing Plans and Programs, HQ AFSOC, interviewed by author, 21 February 2002.

³⁵ Capt Lisa Manion, USAF, 16th Operational Support Squadron Current Operations, Hurlburt Field, FL, interviewed by author, 21 February 2002.

268 tanker requests (43%).³⁶ Talking to an army representative that handles SOCOM requests for support to the 160th SOAR, I found similar results for the last quarter of 2001 where only 7 of 35 requests were fulfilled (20%), and for the timeframe of 1 Jan to 28 Feb 2002 where 6 of 11 requests were fulfilled (54%).³⁷ The same representative said there should be even more, but many are made and cancelled by voice only, without recording. These numbers were confirmed in a message for HQ AFSOC to HQ USAF/XP on 8 April 2002, which stated, “Currently, AFSOC active duty forces only fulfill 35 percent of the tanker requests received for training and exercise events. With the addition of the Reserves, the overall rate only rises to 67 percent.”³⁸

If a 74 percent rate of requests fulfilled in 1999 sounded bad, a 20 percent in the last quarter to the 160th SOAR is appalling. Something needs to be done about this before it starts having an adverse affect on aerial refueling performance. A lack of proficiency could lead to the inability to complete a mission, or a crash if left unresolved. AFSOC has recently recognized the problem. Now it needs to set in motion the measures to find a solution.

MC-130Ps. The main refueling tanker for the past ten years has been the MC-130P Combat Shadow aircraft. These aircraft are over thirty years old and it is starting to show on them. Their maintenance records are less than stellar. In 2001 they had a maintenance cancellation rate of 20 percent.³⁹ Their age has been having a deleterious effect on their performance for some time. A tanker is never sent out to do a critical mission alone because of it; they are always sent out in pairs.⁴⁰ This is not factored into the JMA of force structure. The situation would look very bad if you “realistically” cut the tanker force in half—as it’s done in practice. This leads to the fact

³⁶ Diane Borgsteede, Software Engineer, C4IAS Contractor, 16th Operations Group LAN Office, interviewed by author, 21 Feb 2002.

³⁷ Tom Cumbee, GS-11, 16th Special Operations Wing Plans (XP), Hurlburt Field, FL, interviewed by author, 21 February 2002.

³⁸ “AFSOC Need for Additional C-130 Tankers,” HQ AFSOC Message R 082300Z Apr 02, Hurlburt Field, 8 Apr 2002.

³⁹ 16th Operations Group LG records, obtained 26 April 2002.

⁴⁰ Lt Col Monty Sexton, USAF, AFSOC IG, former 9th Special Operations Squadron Commander, interviewed by author, 28 November 2001.

that the tankers are “tapped out.” They are so busy they cannot support the AEF cycle.⁴¹ Instead the Reserves have to pull active duty slots, and there is no end in sight. “We had to activate the Reserves as soon as OEF kicked off and I can’t see deactivating them in the near future” commented the AFSOC Director of Staff in an interview.⁴²

A second problem with the Shadow fleet is their “non-penetrating tanker” status. Officially they are to be used only for permissive environments, similar to Rescue tankers. However, the reality of the situation is that this asset has been “penetrating” since Operation DESERT STORM. Every operational interview I had confirmed this finding. In a recent operation in Afghanistan the Shadows were five miles from Kandahar during a mass evacuation of the city in daylight.⁴³ This was in an environment that had “manpads everywhere.”⁴⁴ Daylight operations are not part of SOF tactics, much less daylight penetrating tactics in an asset referred to as a “non-penetrating tanker.” This is quite a risky situation given the lack of electronic countermeasures on the Shadow. And again, the JMA does not account for this as they predict the Talons can carry the load of all needs for penetrating tankers.

The Army Way. The army tends to aggravate the situation of “not enough tankers” in a roundabout way. It is an army tendency to keep only a few key personnel qualified and current in helicopter aerial refueling operations.⁴⁵ They do not see Helo AR as a necessity and would be just as happy to ground gas from fuel bladders or FARP operations. AFSOC aggravates this situation with the appalling support rates. However, with current operations in desert conditions, this has led to the destruction of some fairly

⁴¹ Lt Col Albert H. Williams, USAF, 8th Special Operations Squadron Operations Officer, interviewed by author, 27 November 2001.

⁴² Colonel Dennis L. Barnett, USAF, Director of Staff, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 28 November 2001.

⁴³ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

⁴⁴ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001. Manpads refer to man-portable defensive systems, such as shoulder-fired rockets or missiles.

⁴⁵ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

expensive engines.⁴⁶ When the army wants to transition to Helo AR, they plan in a quick spin-up period to get themselves requalified.⁴⁷

The “just-in-time” plan works well for the army, but it aggravates an already thin tanker situation. The tankers have a difficult time scheduling for a situation where they are not needed one day, and then needed for all they can give the next when the army realizes it needs to get its personnel requalified in Helo AR. But the army is tied to the ground and they would never let something like a lack of air assets slow them down, so they always plan for a ground-gas option also. This leads to a vicious cycle of “we need you, no we don’t” and the tankers end up on the end of the whip. This is an ineffective way to coordinate for force requirements.

Skyrocketing Probes. The army may not see Helo AR as a requirement, but they are modifying their aircraft to take advantage of the possible capability. In 1991 Army special operations had no aircraft with probes. By 2001 they had 37 probed MH-47s and 54 MH-60s. The current plan increases those numbers to 62 MH-47s and 75 MH-60s in the near future. The air force numbers have stayed fairly constant over the past ten years, with some decreases. In 1991 there were 51 probed aircraft. This number rose to 57 with the addition of some TH-53s in the mid 1990s, but has reduced to 34 in 2002. These numbers are planned to increase to 50 as the CV-22 becomes operational.

The tanker assets over the same time have remained fairly constant, with 24 MC-130Ps (23 following the 13 February 2002 crash in Afghanistan) and 14 MC-130Es. This brings a probe to drogue (helo to tanker) ratio of 1.34 to 1 in 1990, increasing to 3.5 to 1 in 2002. It is no wonder that the tankers have a high operational rate and difficulties meeting the helicopter training requests. In England the AFSOC ratio of probes to drogues is 1.6 to 1 and according to personnel who have trained with this ratio there is no problem meeting training requirements.⁴⁸ Something needs to be done about the skyrocketing number of probed helicopters without commensurate increases in tanker

⁴⁶ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

⁴⁷ Lt Col T. Tracey Goetz, USAF, HQ Air Force Special Operations Command (AFSOC) Plans (XPP), interviewed by author, 27 November 2001.

⁴⁸ Lt Col John C Buss, USA, and Maj Donald A. Gresham, USAF, “Structural Analysis of Peacetime Air Refueling (AR) Training Requirements,” (point paper, USSOCOM SORR-SCA, August 1999).

aircraft. As stated earlier, AFSOC has started the ball rolling with a message to HQ USAF/XP requesting additional tanker aircraft.

Results of Analysis

The USSOCOM force structuring process with regards to the tanker fleet is currently in dire straits and need of help. The forecasting of tanker requirements has been less than optimal as CSAR and training events are not accounted for. The supposed savings of the MC-130H Talon IIs and CV-22 Osprey will not bring about the refueling savings that was originally thought. The Talons will help the situation, but the Osprey may offset it by aggravating the situation. The evaluation devices utilized to assess requirements, namely the JMA and SORR reports are based on some faulty assumptions and their predictions have not met with reality. Non-penetrating tankers have been required to fill penetrating tanker roles and there has been an abysmal non-support rate during training and exercises. The army has aggravated the situation with their “just-in-time” scheduling practices, and the probe to drogue ratio has more than doubled over the past ten years.

The realities of the situation are that the AFSOC tanker assets are aging, overworked, and unable to support the needed refueling requirements. It is a training nightmare and has recently become an operational one too. According to the Pave Low squadron commander who was working at the Joint Special Operations Task Force in Afghanistan, tankers were required for many of the missions. When they were not available the missions did not go.⁴⁹ The shortages have caused a situation where a support asset is driving the operational pace of war. This is not an optimal situation to be in when lives are at stake, so changes are necessary. Suggestions for those changes will be the focus of the next chapter.

⁴⁹ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

Chapter 6

IMPLICATIONS

...the strong do what they can and the weak suffer what they must.

Thucydides

The future strategic environment will continue to pose threats and opportunities to flex SOF muscles against global threats. Anti-access problems will lead to a continued reliance on tanker assets to support deep strikes in enemy territory. American global interests demand that we pay attention to the AFSOC tanker problems. “Business as usual will not provide the capabilities we need to deal with the transnational and asymmetric opponents of tomorrow.”¹ While the situation looks bleak, senior AFSOC leadership have begun to “perceive the need for more C-130 tankers.”² And whether they are short or not, day to day operations continue as special operators keep the tanker mission alive.

After studying this problem in depth I have developed a number of suggestions to help tanker operations and forecasting mechanisms operate more smoothly. This includes suggested improvements to both the process and product. They are categorized into four areas: training, materiel, organizational, and additional solutions. They are not designed to be the “school solution” to the problems, or to poke fingers in anyone’s process. They are observations and one additional tool for making future force structure decisions. Their implementation will bring about additional assets and flexible employment options.

Training Solutions

The training recommendations are grouped into two categories: those for forecasting training requirements and those for coordinating training between the air

¹Schoomaker, Peter J., General, USA, USSOCOM Commander in Chief, “The Way Ahead,” (unpublished paper, December 1997), 15.

²“AFSOC Need for Additional C-130 Tankers,” HQ AFSOC Message R 082300Z Apr 02, Hurlburt Field, 8 Apr 2002

force and army. The first suggestion is for a correction to the flawed SORR report. SOCOM needs a flexible planning tool with explicit assumptions that can be varied as necessary to show differing results and provide commanders and planners a device to see how assumptions drive force structure. The input would be the number of helicopters and the various assumptions associated with their training. The output would be the required number of tankers. This would be the peacetime associate to the JMA SOFAMS planning tool. It would allow users to analyze force structure based on training requirements and variable planning assumptions. The user could see exactly what the variables were, and if they disagreed with them, could change them and see the effect on the force structure.

Variables within the system should include: number of tankers, number of vertical lift assets, expected maintenance rates, time on track to accomplish training, expected damage to refueling hoses in training, individual crew member's time between training events, distance from base to training track, number of pilots per aircraft per training event, fuel load on tanker, and fuel offload to helicopter, to name a few. Each variable would have a base figure that could be changed for sensitivity analysis. The assumptions should be clearly visible so the planners know exactly what they have to work with. It would provide the empirical data required to make force structure decisions, based on training requirements, that the JMA fails to accomplish.³

A second training suggestion is that the army needs to train their helicopter pilots to proficiency and maintain their currencies like the air force helicopter pilots. The army needs to hold AFSOC to the fire to provide tanker assets to accomplish this task. This will benefit both the air force and the army. Currently they are stuck in a vicious cycle where the army helicopter pilots are either non-current, or screaming for training. The air force says the army doesn't see AR as a necessity, but provides inadequate support to the army requests. With a proactive plan to keep their pilots current they would have additional flexibility to use Helo AR when ground refueling would be detrimental, they would not have to spend valuable training time to get their pilots recurrent, and they would not have to rely on the air force to provide last minute training. This would also

³ Colonel Dennis L. Barnett, USAF, Director of Staff, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 28 November 2001

help to reduce the operational load on the other aircraft currently tasked with delivering FARP fuel bladders. A proactive plan would benefit the air force as they could forecast further out into the future for required training, maintaining currency for both air force and army helicopter pilots. This would have the added benefit of supporting joint operations and reinforcing the way we go to war during training.

Materiel Solutions

The materiel solutions need to solve the problem of “definitely not enough tankers.”⁴ The non-support rates are atrocious and combat operations have been detrimentally affected. The CV-22 will almost assuredly bring additional requirements for aerial refueling. If the SOF vision is to be able to “deploy immediately and discretely to flashpoints in adequate time to organize coalition efforts for relief or conflict,” then improvements are required to the current fleet. Three are provided for discussion: accelerate the MC-130H refueling pod upgrade, transition the MC-130Ps to a higher threat capability, and acquire additional tanker aircraft.

The MC-130H Talon II is the command’s most advanced mobility asset. It has the ability to penetrate where Shadows cannot and a much longer useful life than the Talon Is. In order to support the “forcible entry” requirement to anti-access areas in support of idea such as Global Strike Task Force, this aircraft is vitally needed. The T-IIs support the QDR need for “immediately employable and deployable” and the need for “the ability to conduct covert deep insertions over great distances.”⁵ They are currently scheduled to have their modifications in FY 2003-2008. This process should be “test accelerated” as this is the quickest fix for the current shortages. After speaking to members of Det 1/46th Operations Group at Hurlburt Field, those responsible for the developmental testing of the new pods, they “would definitely be able to accelerate testing on the pods to provide at least minimal operational capabilities.”⁶

The second materiel recommendation is to transition the MC-130Ps from non-penetrating to VMC penetrating tankers (no terrain following radar). The term “non-

⁴ Lt Col Michael J. Kingsley, USAF, 20th Special Operations Squadron, Commander, interviewed by author, 17 December 2001.

⁵ Donald H. Rumsfeld, *Quadrennial Defense Review*, 30 September 2001.

⁶ Capt Michael J. Meyer, USAF, MC-130H Flight Commander, Det 1/46 Operations Group, Hurlburt Field Florida, interviewed by author, 25 April 2002

penetrating” is “poor wording and takes away from the capability anyway.”⁷ The assets are already conducting operations as penetrating tankers and just accepting the risk involved. This demonstrates a disconnect between aircraft programming and operational employment realities. The air force should not be placing these dedicated aerial refuelers in this position. Everyone I interviewed, from operational pilot to senior leadership, agreed that we “need to transform the Papas [MC-130Ps] to a higher threat since they are already doing the mission.”⁸

According to the 16 SOW/CC this would not be a difficult task. The air force would “just need to provide them low-band jammers.”⁹ I also believe they should have Directed Infrared Countermeasures (DIRCM) and Common Avionics Architecture for Penetration (CAAP) to be truly penetrating. All Shadows should be equipped with the ability to receive fuel through the Universal Aerial Refueling Receptacle Slipway Installation (UARRSI). Since the AFSOC aircraft are positioned to go through the Avionics Modernization Program (AMP) in 2008 to 2011, the Shadows could be upgraded at that time. AMP is supposed to make the C-130 aircraft more similar, and these proposed changes would bring the AFSOC tankers in-line with AMP intentions. This would have the added benefit in training dollars as all MC-130 crews could be trained on some similar equipment (DIRCM, CAAP, UARRSI) in the same facility.

Making the MC-130P into a penetrating tanker would provide the additional flexibility to the USSOCOM planning tools that is required to win a war in an uncertain environment. Planners would not have to rely on the Talons to support all the penetrating missions, and commanders would not be placing the Shadows into a risky environment when they penetrate. This transition and flexibility would help to support the Air Force Vision 2020 to provide a “fast, flexible, responsive, reliable support as foundations to all Air Force operations.”¹⁰ If we are to embrace uncertainty in the future we should have

⁷ Colonel Lyle M. Koenig, USAF, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

⁸ Brig Gen Richard L. Comer, USAF, Air Force Special Operations Command (AFSOC) Vice Commander, interviewed by author, 28 November 2001.

⁹ Colonel Lyle M. Koenig, USAF, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

¹⁰ *America's Air Force Visions 2020, Global Vigilance, Reach & Power*, US Air Force, 2000, available from <http://www.af.mil/vision/vision.pdf>.

assets that can flex to missions without placing our operators in an undue amount of risk. Planning should begin now to make the MC-130P a penetrating tanker.

The third materiel suggestion is to obtain additional C-130 tankers. The recent HQ AFSOC message highlights this problem with a request to explore solutions. In the mid-1990s AFSOC sacrificed many things to keep the CV-22 healthy. One of those things was the tanker fleet. According to the 16th SOW Wing Commander, “We cut back too much on tankers to purchase CV-22s.”¹¹ Now it is time to pay the piper.

To come up with a rough estimate of the additional tankers required I evaluated past operational utility. It seems everywhere SOCOM sends helicopters for missions they send half as many tanker aircraft. This policy seems to have worked for the past ten years. Using that schema, the current plan for the year 2013 is to have at least 191 probed aircraft (62 MH-47s, 75 MH-60s, 41 CV-22s, and 13 MH-53s). Since AFSOC does not need half as many tankers for training missions, the probe to drogue ratio I suggest is 2.5 to 1. This is a compromise between operational utility and training requirements, and is in agreement with an independent SOCOM finding that “anything above a 2.8 to 1 probe to drogue ratio is unmanageable.”¹² Therefore AFSOC needs 76 tankers to support 191 probes. Allowing the MC-130Es to retire, the USSOCOM plan is to have 20 MC-130Ps and 24 MC-130Hs. That would require an additional 32 aircraft (18 if they keep the MC-130Es alive). So, my suggestion is for AFSOC to acquire 32 additional tankers.

The three materiel suggestions would help to bring the probe to drogue ratio back under control while providing flexibility to operational commanders to use the assets as required. These improvements will help AFSOC to meet its top two mobility requirements of “unrestricted range” and “detection avoidance.”¹³ AFSOC must continue to plan for other than optimal solutions and must be provided the equipment to accomplish the mission. Fog and friction, ambiguity, chance, and uncertainty will

¹¹ Colonel Lyle M. Koenig, USAF, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

¹² Maj Charles H. Meyers, USAF, USSOCOM, Assessment Officer for Fixed Wing Assessment Division, interviewed by author, 5 Dec 2001

¹³ Howell, Scott L. “FY 04-29 Mobilization Plan AFOSF 2030.” lecture, Hurlburt AFB, FL, 17 December 2001, slides.

continue to dominate future battlefields. Bringing on new materiel assets will help to ensure we never leave the CV-22s on the ground without fuel.

Organizational Solutions

SOCOM and Rescue aerial refueling were qualifications developed together. In the 1960s there was the requirement to extend the range of the helicopter for sensitive missions into territory requiring vertical lift—the rescuing of downed aircrew in Vietnam. The same requirement exists today to extend the range of helicopters, whether for Rescue or for special operations missions. There are many reasons these two organizations should be combined and only a few that they should not. The primary reason is to provide a “single air manager for probes and drogues” leading to a sole provider of theater Search and Rescue.¹⁴

Currently SAR assets are piecemealed out and considered a “low-density, high demand” mission. As discussed in chapter 5, over the past ten years this mission has quite often fallen to SOF forces that are already at a high operational tempo. However, “SOF are not organized, equipped, or trained to conduct SAR or CSAR as continuing missions.”¹⁵ The JMA does not consider CSAR in force structuring, as the executive agent for CSAR is the Air Force, and Air Combat Command (ACC) in particular, not SOF. Thus SOF forces are called to conduct missions without proper manning levels associated with that mission. This leads to the situation where SOF tankers are overwhelmed with taskings, as has been the case through most of the 1990s.

Secondly, “The Air Force has the best resources for theater CSAR, but the SOF commander controls the AF’s best rescue aviation assets.”¹⁶ SOF tankers are not trained in the intricacies of conducting SAR like Rescue forces. The schoolhouse for both SOF and Rescue tankers is collocated at Kirtland AFB, and SOF previously trained for SAR patterns and life raft bundle drops, but they currently do not. Luckily, aerial refueling a helicopter on a rescue mission is quite similar to that of a special operations mission. But there are some differences, like command and control and the addition of other airplanes

¹⁴ Koenig, Lyle M., Colonel, USAF, 16th Special Operations Wing, Commander, interviewed by author, 18 December 2001.

¹⁵ Joint Publication 3-05, *Doctrine for Joint Special Operations*, 28 October 1992, 13.

¹⁶ Joe E. Tyner, “AF Rescue & AFSOF: Overcoming Past Rivalries for Combat Rescue Partnership Tomorrow.” (U.S. Navy Postgraduate School Research Report, 1998), 58.

tankers do not normally deal with, such as Sandys (search and rescue mission commanders). This leads to a dynamic environment where the SOF personnel are “making things up on the fly.”

“Neither ACC forces, due to limitations in weather capabilities, nor SOF, due to inexperience in search and rescue task force (SARTF) utilization, make an optimum combat rescue force alone.”¹⁷ What would be optimal would be to have the assets of both SOF and Rescue available and trained under similar conditions. This is not to suggest that they are trained to the same standards, as their missions are truly quite different, but that they both share some of their culture and experience with the other entity. Rescue should continue to improve their penetrating capabilities and SOF would receive SARTF experience. And in the end, when the JFC needed rescue, no matter what the threat level, he would look to SOCOM to provide the SOF or Rescue forces needed. Then a single air manager would train, organize, and equip tanker and vertical lift assets in the conduct of theater SAR.

The February 2002 Corona Conference began to look at this issue in order to find a proper place for CSAR.¹⁸ One experienced Rescue and SOF pilot, Colonel Joe Tyner, suggests that the combination of assets would diminish the effectiveness of each as “standardization of tactics [is of] no benefit to either.”¹⁹ Rescue could not perform SOF tactics without necessary improvements to their systems and SOF does not have the time to train on all the Rescue patterns. I agree with this philosophy, but do not think the two organizations have to standardize tactics to be combined. Rescue and SOF should still each train to the standards they currently use, but they should combine efforts in joint rescue operations and cross talk about operational issues affecting both similarly, such as how to conduct a SARTF. This would provide Rescue additional penetrating experience and SOF additional rescue experience. And it would allow SOCOM leadership to proactively plan for contingencies and future rescue operations. The resulting organization would implement the principles of war of unity of command and economy of force. If SOF is going to continue to accomplish this sensitive mission, as they

¹⁷ Joe E. Tyner, “AF Rescue & AFSOF: Overcoming Past Rivalries for Combat Rescue Partnership Tomorrow.” (U.S. Navy Postgraduate School Research Report, 1998), 63.

¹⁸ Rolfsen, Bruce, “Finding a New Home,” *Air Force Times*, 25 February 2002.

¹⁹ Tyner, 68.

inevitably will in the future, they should be trained, funded, and provided assets to do so professionally. Placing Rescue and SOF together under SOCOM is the first step in the process.



Figure 4
MH-53 Aerial Refueling

Additional Suggestions

The last area of recommendations is under the “other” category. This includes two suggestions for better coordination within the tanker allocation process and one proposal for improvements to the JMA process. The first idea is for better coordination between the SOCOM Assessment Directors and the AFSOC operational commanders. Talking to each, they blamed the other for not understanding their situation and problems. This was even more exaggerated between the staffs that truly did not understand each other’s position. They wanted to help, but just did not understand how. Some USSOCOM members felt AFSOC had the resources to accomplish the tanker mission. Others felt they were short of resources, but lacked quantitative data to back up their opinion. In AFSOC the planners either did not understand the JMA process or felt it was seriously flawed. As stated earlier, AFSOC had to send me to SOCOM for them to explain the JMA process.

The Assessment Director's handbook describes required coordination between SOCOM and AFSOC senior leadership during the development of the Objective Force, but neglects to mention required coordination between the staffs. This is a key part of the process that I felt could use some improvements. It will at least alleviate some of the misconceptions each office has about the other. Secondly, the ADs and senior AFSOC leadership need to improve their coordination. It seemed to me that the ADs did not see the "real" operational shortfalls and that the AFSOC leadership was not pressing the issue of requiring more tankers to the people who could recommend purchasing aircraft.

The second recommendation for coordination was much more obvious. The operational pace of AFSOC has led them to fail to track their "non-supported tanker" missions very well. As stated earlier, they just "cancel the sortie and move on." This is data that is valuable to both the senior AFSOC and SOCOM leadership. They should be apprised of trends before a shortfall limits their operational capability. This data will add the quantitative evidence the planners needed to show tanker deficits. The 16th Operations Group should begin to accurately track tanker supported and non-supported missions, including voice requests. They should then brief this information up the chain of command so the leadership is aware of it. This paper trail will provide the commanders with valuable feedback to plead their case for additional resources.

The last suggestion in the "other" category is for adjustments to the JMA process. The SOFAMs model needs to add in some sort of "slop" figure to deal with things like high maintenance cancellation rates as aircraft age, Talons not being available because they are tasked for other missions, and the attrition that will inevitably be a part of the fog and friction of combat missions. The AFSOC/XP operators should then have a chance to critique the implicit and explicit assumptions in the REF. This will improve both the process and the coordination issues. If the REF is a scientific process it should produce results that mirror reality. And the reality is that the tankers are short and overwhelmed. Forecasting is an iterative process, and the JMA can use some minor fine-tuning to improve the process.

Overall Recommendation

While the AFSOC tanker shortfalls have been noted, there are possible solutions to this dilemma. They include training, organizational, materiel, and other changes to the current conduct of operations. The suggested improvements include a flexible training tool for forecasting training requirements based on variable assumptions and the combination of Rescue and SOF under a single air manager for all probe and drogue aircraft. Materiel solutions were suggested to increase both the tanker assets and improve their capabilities to provide flexibility to operational commanders. Lastly, increased coordination both within AFSOC and between AFSOC and SOCOM was suggested to increase the efficiency of the JMA process. These recommendations are not meant to be a panacea for the difficulties involved in making force structure decisions. They are meant as suggestions to close the gaps between programmed AFSOC capabilities and future security requirements. With continued vigilance towards providing the best forces possible for USSOCOM to conduct its mission of conducting special operations across the spectrum of conflict, we can continue to provide for the America's security against peer competitors, asymmetric threats, and unknown wildcards.

Chapter 7

CONCLUSIONS

*A little learning is a dangerous thing;
Drink Deep, or taste not the Pierian spring;
There shallow Draughts intoxicate the Brain;
And drinking largely sobers us again.*

Alexander Pope, "An Essay on Criticism"

"US Special Operations Forces are conducting more missions, in more places, and under a broader range of conditions than ever before."¹ In 1999, SOF units deployed to 152 countries and territories (not including classified or special access programs), and before 11 September 2001, in a given week, 5000 operators were deployed in approximately 60 countries worldwide.² This number has grown substantially due to recent events in the war on terrorism. Their missions range from humanitarian assistance and disaster relief to direct actions against terrorist training camps and support networks. The workhorse of USSOCOM is the helicopter and the means to overcome access problems is aerial refueling. This paper has tried to bring out the history of this resource, the future operating environment, force structure plans, forecasting and allocation deficiencies highlighted by actual operations, and suggestions for overcoming these deficiencies.

This concluding section will provide a brief overview of the findings within the paper and the principal conclusions from the research and analysis of comparing programmed assets to a predicted environment. The relevance of this study cannot be overstated. The situation within the tanker fleet is crucial to all special operations mobility missions since fuel enables mission accomplishment. Inevitably this research is only preliminary and leaves the subject unfinished. Therefore I have provided the reader with two avenues for continuing this research in the future. Hopefully this paper will

¹ General Peter J. Schoomaker, USA, USSOCOM Commander in Chief, "Posture Statement 2000," *United States Special Operations Forces*. USSOCOM, 2000, 15.

² Ibid.

whet the appetite of another student to continue analyzing vertical lift aerial refueling tanker operations.

Summary of Findings

This paper began with a summary of the development of SOCOM and AFSOC. This was provided to define the contextual environment for the growth of SOF helicopter refueling operations. There has been a cyclical pattern of build-up and drawdowns with the many conflicts. USSOCOM was activated on 16 April 1987 and 23rd Air Force became AFSOC on 22 May 1990. Together they have the missions of Foreign Internal Defense, Counter-Terrorism, Direct Action, Special Reconnaissance, Unconventional Warfare, Psychological Operations, and Civil Affairs. Helicopter aerial refueling evolved from the requirement to extend the operational capability of the Air Rescue Service during Vietnam. There have been few changes to the mechanics of aerial refueling, but recent modifications have turned it from a day-only, fair-weather activity to a robust day and night, low-level tactic required to prosecute today's SOF operations.

While the past is well documented, the future is speculative. We cannot be certain of future events, but we can be fairly sure about trends. The security environment of 2007 to 2012 will be characterized by a reliance on technology in an interconnected world with the US continuing to lead. "Regional conflict remains possible, proliferation of weapons of mass destruction (WMD) is a major concern, and we face a number of nontraditional, transnational, and unpredictable threats to our security."³ Threats to our security include WMD, subversion, terrorism, global environmental degradation, illegal drugs, information-based warfare, and other challenges to international stability and prosperity. Our evolving National Military Strategy provides guidance to deal with our enemies by shaping the international environment, responding to both regional and transnational threats, while preparing for an uncertain future.

USSOCOM will support the future military effort, including the concept of Global Strike Task Force, by providing a force with unlimited range and precision capabilities. SOF will need to be agile and flexible, with the range to conduct operations

³ General John M. Shalikashvili, U.S. Army, Chairman, Joint Chiefs of Staff, *National Military Strategy: Shape, Respond, Prepare Now – A Military Strategy for a New Era*. 1997. Available from <http://www.dtic.mil/jcs/nms/>, 5.

to bring about mobility in denied territory. Aerial refueling will be the mechanism to obtain the range in anti-access areas in order to prosecute special operations' missions. Future upgrades to MC-130 aircraft are planned to provide the capability to the programmed fleet of CV-22s, MH-53s, MH-47s, and MH-60s.

While the airpower portion of the SOCOM future looks strong, there are major problems with the force planning of the refueling tankers to support their missions. First, there is an unknown number of aerial refueling assets to support and an unknown, but ever increasing, number of probed helicopters and CV-22s. Planned upgrades to the MC-130 fleet will tie down resources, and slips to the CV-22 will add confusion to force plans. Added to this is the misperception that the MC-130H will solve the refueling problems and that the CV-22s will have less refueling requirements. The MC-130Ps have also increased their risk levels conducting CSAR operations and missions as penetrating tankers. There is currently no method to predict force structure requirements for training, and tanker non-support rates have been alarming. This has led to an environment where our forces are over-tasked and forced to conduct missions for which they are not manned, resourced, or trained.

What is truly needed in this uncertain environment is added flexibility. Increasing the capabilities of the MC-130P, accelerating the MC-130H refueling pods, and increasing the number of tanker platforms would help to alleviate these problems. Also, better coordination efforts between planners and operators, and between SOCOM and AFSOC will help to decrease confusion. Lastly, combining Rescue and SOF forces under a single air manager for probes and drogues would provide a one-stop shop for theater SAR. Training, organizational, and materiel solutions to apparent deficiencies should be implemented to bring about needed stability in the AFSOC tanker environment.

Principal Conclusions

The conclusions of this research are fairly straightforward. They are a combination of apparent deficiencies and suggested improvements in the product and process of forecasting force structure requirements for helicopter aerial refueling tanker operations. The product deficiencies are that AFSOC is woefully short of tankers to

complete current operations, they need to upgrade the MC-130Ps to be able to penetrate a higher threat environment safely, and they need to design a flexible training tool to predict tanker requirements. The shortage of tankers will be slightly alleviated by the addition of the MC-130H Talon IIs, which should begin as soon as possible. The CV-22 Ospreys may worsen the situation due to their speed and high fuel requirements when they need fuel. The MC-130P Shadows need improvements to provide commanders the confidence to continue to use them in the environment they already operate, but with added safety. And, the overall numbers of tanker assets should be increased by approximately 32 aircraft to provide resources to operate as they are currently tasked without overwhelming the crews and Reserves. Lastly, AFSOC needs to design a quantitative model with variable assumptions to provide a product similar to the Special Operations Force Analysis and Modeling System of the Joint Mission Analysis for predicting peacetime training needs.

The process deficiencies and suggested improvements include increasing coordination efforts within SOCOM, correcting JMA assumptions, and a consideration for combining AFSOC and Rescue forces under a single air manager. The coordination efforts need to be improved between the SOCOM planning staff and the AFSOC planning staff such that each understands the other's mission and operational effects. The "shortage of tanker assets" should be evaluated and agreed upon by both sets of staffs and briefed to the senior leadership to correct deficiencies. The 16th Operations Group should track tanker non-support sorties meticulously such that a paper trail is formed to show problem areas. The senior leadership should coordinate better to provide quantitative data to support qualitative opinion for either a deficiency or acceptable level of tanker assets. Also, the JMA assumptions should be re-evaluated for applicability and factors such as attrition, maintenance rates, and variable fuel burn rates should be included. This would help the scientific portion of the planning process mirror reality better.

Lastly, Rescue and SOF forces should be combined for unity of command of probe and drogue assets. This would benefit Rescue as they might achieve more attention to their needs for upgraded equipment that they were not receiving in Air Combat Command. They would also be able to train with AFSOC in order to develop better formation, night vision goggle, and low-level skills. The combination of resources

would also benefit AFSOC who could manage the allocation of CSAR assets better while providing training and experience to their crews in the conduct of CSAR operations. SOF should be “organized, trained, and equipped” for the mission they have been accomplishing over the past twelve years.

Relevance of Study

I began this study with the end purpose of adding information to a very limited knowledge base. While analyzing the tanker situation I heard time and time again from operators how critical a resource the tanker was to SOF operations and how short the resource was. However, I realized the true criticality upon interviewing a senior helicopter pilot just after returning from Operation ENDURING FREEDOM. When he stated that SOF operations were dependent on tanker availability and that the tankers were limiting the operational pace of war, I gained much more respect for this research. In the future we will continue to be challenged with access problems (like the land-locked Afghanistan) where vertical lift air operations will be infeasible without SOF tankers. If US vulnerability to anti-access situations is an increasingly larger hurdle we must cross, SOF tankers problems must be solved. This deserves greater attention in the future to maintain capabilities necessary for national security.

Suggested Further Research

This paper is just the tip of the iceberg. As noted in the introductory chapter there is almost nothing written about helicopter aerial refueling. It is a small, but valuable support asset that deserves much more analysis. Towards that end, there needs to be a full SOCOM Airlift-Tanker study. This study should go beyond this thesis in its analysis of AFSOC mobility and helicopter/CV-22 requirements in view of the projected international security environment, evolving threats, emerging national military strategy, and programmed inventories of probed aircraft. The study should recommend doctrine, organization, training, materiel, leadership, personnel, and facilities solutions to deficiencies noted. This would need to be a professional study focused on making improvements benefiting both army and air force assets. Army assets should be evaluated much more in-depth than in this thesis. This study has been suggested

previously. Hopefully this paper has helped to bring to light the plight of the future tanker force structure and will help to provide support for the funding of this study.

A second recommendation for further research goes one step further than the Airlift-Tanker study. This would encompass an evaluation of the vulnerability of AFSOC mobility assets in the years following 2015. In this timeframe it has been suggested that the threat-level will be such that C-130s will be unable to function safely.⁴ If this is true it is now time to start planning for a new “SOF-specific” asset to replace the MC-130s, such as an MC-X. This asset would have to be a “faster, low-observable, long-range asset that can operate in a high threat environment” supporting SOF deep insertion operations.⁵ It is time to research the need for this asset so that USSOCOM can efficiently plan for the required expense that will inevitably come as the MC-130s slowly wear out.



Figure 5
MH-60 in Contact Position

⁴ Lt Col Scott L. Howell, USAF, Chief of Strategic Plans, HQ Air Force Special Operations Command (AFSOC), interviewed by author, 27 November 2001.

⁵ Hutcheson, Keith, “AFSOC’s Future Achilles Heel.” *Armed Forces Journal International* 138, no. 7 (Feb 2001): 47.

Appendix A

SAMPLE INTERVIEW QUESTIONS

1. How has helicopter aerial refueling changed over the past 10 years (1991-2001)?
2. What factors drive the probe to drogue force ratios?
3. Do you know what the current probe to drogue ratio is?
4. How many probes out there? How many drogues?
5. What do you think of the current probe to drogue ratios?
6. What are the assumptions that drive the current probe-drogue ratio? (maintenance rates, on/offload capability, expected range/duration of sorties)
Are they realistic? Will they change in the future?
What have been the changes in force ratios over the past 10 years?
7. Will droguing the 24 MC-130Hs help the overall situation?
8. What will the CV-22 do to the situation?
9. How many CV-22s are expected to come into AFSOC? When?
10. Are we utilizing our tankers most effectively? If not, how can we improve?
11. Do you know of any instances where the helicopter mission was delayed for lack of tanker support?
12. Are there any contextual factors that affect tanker operations beyond the force ratios (extra missions not associated with AR)?
13. How do you see the strategic environment changing over the next 10 years with respect to AFSOC?
14. Do you see any future employment changes that will result in necessary force ratio changes?
15. Do you see any other future AFSOC tanker operations (refueling UAVs)?
16. What are the limiting factors in tanker support of Helo AR?
17. Do you have any after-action reports over the past 10 years that I can have access to?
18. Do you have access or have ever heard of previous tanker requirement analysis?
19. What is the best mix of fixed wing AFSOC air refueling tankers?
20. Can I use your name and squadron in my thesis?

Appendix B

GLOSSARY OF ABBREVIATIONS

ACC	Air Combat Command
ACG	Air Commando Group
ACW	Air Commando Wing
AD	Assessment Director
AEF	Air Expeditionary Force
AFHRA	Air Force Historical Research Agency
AFSOC	Air Force Special Operations Command
AFSOF	Air Force Special Operations Forces
AOR	Area of Responsibility
AMP	Avionics Modernization Program
ARRS	Air Rescue and Recovery Service
ARS	Air Rescue Service
CAAP	Common Avionics Architecture for Penetration
CCTS	Combat Crew Training Squadron
CINCSOC	Commander in Chief Special Operations Command
CJCS	Chairman, Joint Chiefs of Staff
CNN	Central News Network
COTS	Commercial-Off-The-Shelf
CSAR	Combat Search and Rescue
DIRCM	Directed Infrared Countermeasures
DPG	Defense Planning Guidance
Helo AR	Helicopter Aerial Refueling
IIA	Integrated Investment Analysis
IPS	Illustrative Planning Scenarios
FARP	Forward Arming and Refueling Point
FID	Foreign Internal Defense
FLIR	Forward Looking Infra-Red
GSTF	Global Strike Task Force
ISR	Intelligence, Surveillance, and Reconnaissance
JFC	Joint Force Commander
JMA	Joint Mission Analysis
JV 2020	Joint Vision 2020

LAN	Local Area Network
MAA	Mission Area Assessment
MAP	Mission Area Plan
MNA	Mission Needs Analysis
MNS	Mission Need Statement
MOOTW	Military Operations Other Than War
MSA	Mission Solution Analysis
NEO	Noncombatant Evacuation Operation
NMS	National Military Strategy
NSS	National Security Strategy
NVG	Night Vision Goggles
NVIS	Night Vision Illumination System
OBJ Force	Objective Force
ORD	Operational Requirements Document
PGM	Precision Guided Munitions
POM	Program Objective Memorandum
QDR	Quadrennial Defense Review
REF	Risk Evaluation Force
ROE	Rules of Engagement
SAR	Search and Rescue
SAWC	Special Air Warfare Center
SOAR	Special Operations Aviation Regiment
SOCOM	Special Operations Command
SOF	Special Operations Forces
SOFAMS	Special Operations Force Analysis & Modeling System
SOS	Special Operations Squadron
SOW	Special Operations Wing
SPG	Strategic Planning Guidance
TAC	Tactical Air Command
TDY	Temporary Duty
UARRSI	Universal Aerial Refueling Receptacle Slipway Installation
UAV	Unmanned Aerial Vehicle
USSOCOM	United States Special Operations Command
VMC	Visual Meteorological Conditions
WMD	Weapons of Mass Destruction

Appendix C

CURRENT SOCOM AERIAL REFUELING ASSETS

Air Force Assets¹

MC-130E Combat Talon I. The Combat Talon I is a highly modified, Lockheed C-130E. The airframes are of 1962, 1963, and 1964 vintage. The MC-130E is able to operate within denied or politically sensitive areas to conduct infiltration, exfiltration, and resupply of SOF forces at night or in adverse weather. It is also capable of aerial refueling SOF vertical lift assets either day or night. The Talon I can perform airdrop and airland operations to austere, unmarked drop/landing zones and perform Psyops missions (leaflet and BLU-82 drops). The Combat Talon I is inflight refuelable; its combat radius is limited only by crew endurance. Aircraft modifications include structural improvements to the ramp and tail to allow the ramp and door to operate at all speeds and altitudes, addition of inflight refueling capability (both receiver and tanker capability), fire suppressant fuel systems, a limited armor protection for the flight crew and critical systems, an NVIS modification leading to an NVG compatible cockpit lighting system, and a variety of mission-unique avionics. The major avionics subsystems include a terrain following/terrain avoidance radar, precision navigation capability (including fully integrated GPS), an NVG-compatible heads-up display (HUD), secure communications, and extensive electronics countermeasures capability. Additionally, the aircraft center wing box has been replaced to increase the airframe's service life to 30,000 flight hours.

- Planned Upgrades: Over the next 3 years Active Noise Reduction (ANR), Demand Assigned Multiple Access Modem (DAMA), ARC-222 VHF SINCGARS radio, and the common C-130 Autopilot will be installed. Additional plans are being made to integrate Directed Infrared Countermeasures and ALE-47 systems.

MC-130H Combat Talon II. The MC-130H is a highly modified C-130H. These airframes were built between 1983 and 1990. The MC-130H is able to operate within denied or politically sensitive areas to conduct infiltration, exfiltration, and resupply of SOF assets at night and in adverse weather conditions. The Talon II can perform airdrop and airland operations to austere, unmarked drop/landing zones. It can also perform Psyops missions (leaflets and BLU-82 drops). The Combat Talon II is in-flight refuelable; its combat radius is limited only by crew endurance. The modifications include the addition of receiver aerial refueling capability, structural modifications which allow for high speed aerial deliveries while operating in the low level flight regime, explosion and fire suppressant fuel systems, interior and exterior NVG compatible cockpit lighting systems, and a variety of mission-unique avionics. The major mission avionics

¹ All data from "Special Operations Aviation (SOA) Assumptions, Planning Factors, and Performance Data Guide." *Joint Mission Analysis 2004-2009*. USSOCOM SORR, February 2001 and "AFSOC Present Force Structure – Fleet Composition," *AFSOC Technology Roadmap*. HQ AFSOC/XPQE, Ed 5, Jun 1999. Data not meant to be all-inclusive. For comprehensive mission employment information see AFTTP 3-1 (classified).

subsystems include a terrain following/terrain avoidance radar, integrated precision navigation capability, secure communications, and extensive electronics countermeasures capability. The avionics integration creates a modern, automated, glass-cockpit flight deck including a position for the Electronic Warfare Officer.

- Planned Upgrades: The MC-130H has an on-going upgrade program to enhance capability and improve weapon system sustainment and survivability. Pre-planned Product Improvement (P3I) efforts are underway. The communication suite is being extensively upgraded to add high frequency automatic communication processors (HF-ACP), single channel ground to air radio system (SINCGARS), and narrow band satellite communications (SATCOM). Improvements to the defensive capability are planned with the addition of Directed Infrared Countermeasures (DIRCM), the AN/ALQ -172(v)3. Expanding the operational capability will require the addition of a helicopter aerial refueling system between FY 2003 and FY 2008.

MC-130P Combat Shadow. The MC-130P Combat Shadow aircraft provide SOF with an air refueling capability either day or night, in visual meteorological conditions. The Combat Shadow can perform limited infiltration, exfiltration, and resupply of SOF ground forces by airdrop and airland operations to austere, clandestinely marked drop/landing zones.

These aircraft were originally manufactured as HC-130P and N combat rescue aircraft. The original airframes used for the HC-130Ps were manufactured from 1964 to 1966, while all those used for the HC-130Ns were built in 1969. The basic mission design series (MDS) change was made on 15 Feb 96 to reflect the extensive modifications made under the SOF Improvement (SOFI) program. The SOFI program added an Infrared Detection System (IDS) turret; new communications and navigation equipment; increased threat warning and protection; improved, secure, command and control capability; a limited armor protection for the flight crew and critical systems; and to 15 of the 28 AFSOC MC-130P aircraft, an inflight refueling receiver capability. The flight deck was redesigned to add a second navigator position and the radio operator was moved aft of the FS 245 to right scanner position. The flight deck area was also made more compatible with requirements for night operations, through the addition of Night Vision Goggle (NVG) compatible lighting. Ongoing Air Force common C-130 modifications were combined with SOFI installation schedule; these include Global Position System (GPS), Microwave Landing System (MLS), and HF Automatic Communication System (ACS), all integrated through the Self-Contained Navigation System (SCNS). To extend the service life of the aircraft the center wing box is being replaced. All these modifications should be complete by FQ 3/00. These improvements increase the probability of mission success in the primary mission of the MC-130P, inflight refueling of SOF vertical lift assets. The MC-130P is also equipped with extended range internal fuel tanks (also referred to as Benson Tanks).

- Planned Upgrades: Over the next 5 years Active Noise Reduction (ANR), URC-133 SATCOM terminal system, Demand Assigned Multiple Access Modem (DAMA), ARC-222 VHF SINCGARS radio, and the common C-130 Autopilot will be installed.

CV-22 Osprey. The CV-22 is required to fill the current shortfall in high speed long range infiltration and exfiltration of SOF personnel, direct action, resupply, and airlift of palletized cargo within one period of darkness. It will provide the long-range unrefueled (500nm combat radius) Vertical Take-off and Landing (VTOL) exfiltration capability

currently unavailable to SOF commanders and complements current SOF assets in the long-range infiltration and resupply missions. The aircraft is capable of performing these missions in adverse weather, day or night, and over all types of terrain. This aircraft will replace all AFSOC rotary wing and some fixed wing assets. The baseline V-22 Osprey aircraft has a semimonocoque fuselage with a rectangular cross-section. It is a cantilever high-wing monoplane with a slight forward sweep with the engines mounted on the wing tips. The landing gear is retractable. For shipboard compatibility, the wing and proprotors/blades fold through an electrically controlled and hydraulically actuated system in approximately 90 seconds. The engine nacelles and fuselage sponsons provide emergency flotation. The V-22 is the first aircraft with a wing that can be rotated parallel to the fuselage to create a compact rectangle necessary for operation and storage aboard ships.

The V-22 is powered by two Rolls-Royce Allison AE-1107C turboshaft engines, each capable of producing a maximum power of 6150 shp at 100 percent Np. The engines are derived from the Allison Model 501-M80C (T56-A-127) turboprop. The modular designed engine consists of a torque meter assembly, a 14-stage axial compressor with variable guide vanes, an annular combustor, a two-stage gas generator turbine, a two-stage power turbine, and an accessory gearbox. The aircraft has a digital fly-by-wire (FBW) flight control system. The system is triple redundant and fully integrated with the full authority digital engine control. Electrical power is supplied to all aircraft systems by two constant frequency generators, two variable frequency generators, three transformer rectifier units, a 15 ampere-hour lead-acid battery, and the associated distribution busses and controls. Each engine drives a generator and the midwing gearbox drives the other two. Hydraulic power is provided by three independent 5,000 psi systems. Systems 1 and 2 are dedicated to the flight control systems. System 3 supplies both the flight control and utility systems. Each system is paired with a flight control system to avoid crossing system functions. Each system can support sufficient power to control the aircraft if the other systems fail. Pumps are located in each engine nacelle and in the midwing gearbox. Isolation valves allow proprotor swashplate actuators to function even if the hydraulic system is damaged inboard of the nacelles. Switching valves are located close to the swashplate actuators, and hydraulic lines are separated forward and aft of the wing spar and by at least 18 inches throughout the fuselage. System pressures and fluid levels are monitored by the flight control computers that will automatically isolate a defective system when loss of pressure or fluid is detected. The V-22's fuel system was designed to satisfy diverse multiservice payload radius requirements. The baseline aircraft fuel system consists of feed tanks in each wing and two sponson tanks. A cabin auxiliary fuel tank kit is being developed for all V-22 variants. The V-22 cockpit management and display system is integrated through a dual MIL-STD-1553B digital databus system. The aircraft has no dedicated gauges for instrument readouts. In place of standard gauges and instrumentation, the V-22 incorporates four multifunction displays, one control display unit (CDU), two CDU keyboards, dual redundant mission computers for reliability, and provisions for two helmet-mounted displays.

Other basic aircraft features include a communication suite, navigation systems [global positioning system/inertial navigation system (GPS/INS)], electronic countermeasures (ECM), IR warning system, chaff and flare dispensers, forward-looking infrared (FLIR), and NVG compatibility.

The CV-22 SOF variant is approximately 90 percent common with the MV-22 for airframe and equipment, 100 percent common with flight control software, and 60 percent common with mission software. Major modifications for the CV-22 include the addition of wing auxiliary fuel tanks; a right aft sponson tank; and aerial refueling probe. These additions will allow the CV-22 to meet the SOF long-range mission requirement. It is air refuelable from C-130s, KC-135s, and KC-10s. Other major upgrades are to the aircraft's avionics systems. CV-22 avionics will include a multi-mode radar (MMR) with terrain following/terrain avoidance (TF/FA) for night and adverse weather penetration and navigation. Improved mission computers, digital map and multi-mission advanced tactical terminal systems will provide additional situational awareness in a tactical environment. The suite of integrated radio frequency countermeasures (SIRFC), integrated with an Air Force chaff and flare dispensing system, will increase aircraft survivability in a hostile electronic warfare environment.

Additional improvements have been made in the communications suite (DCS2000 radios) to allow for simultaneous transmit and receive capability on four radios. Flight Engineer seating accommodations, chemical warfare crew provisions, and a survivor locator capability will add to SOF mission readiness.

MH-53J/M Pave Low III/IV The MH-53J is a very capable long-range vertical lift helicopter. The Pave Low performs single ship and formation infiltration, exfiltration, and resupply of SOF in denied or politically sensitive areas. Crews prefer night and adverse weather conditions to avoid detection. The MH-53J also serves as the CSAR backbone to the theater CINCs in operations other than war. Personnel transfer is accomplished by landing, fast rope, hoist, rappel, rope ladder, or combat rubber raiding craft operations to unmarked objective areas. The Pave Low is cargo sling capable. All MH-53Js have folding rotorheads for shipboard operations and have increased max gross weights up to 50,000 lbs. The MH-53J is an evolution of the H-53 helicopter, built between 1966 and 1973, which entered the USAF inventory primarily for search and rescue during the Vietnam era. As a result of the failed Desert One mission in the Iranian Desert in April 1980, Congress mandated and funded the upgrade to all USAF H-53s. The MH-53J Pave Low IIIE configuration has an upgraded engine and rotor system to provide the heavy lift capability. Other mission-oriented modifications include air refueling, armor, armament, ingress and egress gear, and numerous avionics subsystems. The avionics which allow the Pave Lows to conduct their missions include TF/TA and FLIR sensors, an Enhanced Navigation System (ENS), and self-protection warning and countermeasure devices.

- Planned Upgrades: The MH-53J will tremendously increase capability with the addition of the Interactive Defensive Avionics System (IDAS) Multi-mission Advanced Tactical Terminal (MATT) upgrade. This modification adds a new EW processor to integrate aircraft on-board defensive systems and is the first aircraft to fully integrate off-board sensors into the 1553 data bus. Other modifications include a Voice Warning System and an improved night vision illumination system (NVIS). Several sustainment efforts are also planned to increase the reliability and maintainability of the Q-18 FLIR, the TF/TA radar, implement a vibration monitoring system, and other structural improvement initiatives.

LIMITS // AIRCRAFT (Note 1)		CV-22	CV (1)	CV (2)	CV (3)	MH-53J/M
Weights	Min Deployment Gross Weight (lbs) (Note 2)	36,000	36,500	37,000	37,500	33,000
	Min Employment Gross Weight (lbs) (Note 3)	37,000	37,500	38,000	38,500	36,000
	Max Gross Weight (lbs)	60,500	60,500	60,500	60,500	46,000
	EWP Max Gross Weight (lbs) (Note 5)	-	-	-	-	50,000
	Max Gross Weight to Hover (lbs) (Note 6)	49,000	49,000	49,000	49,000	45,600
Fuel	Max Internal Fuel (lbs)	13,850	13,850	13,850	13,850	4,200
	Max External/Aux Fuel (lbs)	-	2,600	5,200	7,800	8,300
	Start/Taxi/Take Off Fuel (lbs)	500	500	500	500	550
	Required Reserve Fuel (lbs)	1,000	1,000	1,000	1,000	900
	Planning Fuel Flow - Employment (lbs/hr)	3,200	3,200	3,200	3,200	2,500
	Planning Fuel Flow - Deployment (lbs/hr)	2,800	2,800	2,800	2,800	2,300
Speeds	Planning Employment Speed (kts GS)	230	230	230	230	110
	Dash Speed -- Employment (kts GS)	275	275	275	275	145
	Planning Deployment Speed (kts GS)	250	250	250	250	110
Load	Troop Seats - Airdrop Config	-	-	-	-	-
	Troop Seats - Airland Config	24	16	10	4	23
Altitudes	Min Employment Altitude (ft AGL)	50	50	50	50	50
	Max Employment Altitude (ft MSL)	10,000	10,000	10,000	10,000	10,000
	Deployment Altitude (ft MSL)	18,000	18,000	18,000	18,000	5,000
LZ	Normal Runway Required (ft)	1280 x 60	1280 x 60	1280 x 60	1280 x 60	150 x 150
	Employment Landing Zone Size (ft) (Note 7)	150 x 150	150 x 150	150 x 150	150 x 150	150 x 150

Note 1: Number in parenthesis indicates number of external/aux fuel tanks. For all descriptors, "Deployment" refers to normal permissive area flight profile. Employment refers to the usual non-permissive profile, typically a night, low-level flight.

Note 2: Aircraft Empty Weight plus deployment crew, their baggage, and equipment normally taken on deployment/ferry flights.

Note 3: Aircraft Empty Weight plus chaff and flare, combat ammo load (see Note 4), tactical crew, their personal equipment, and other equipment normally required for the mission.

Note 4: Combat Ammo Load -- Cv-22: 800 x 50 cal. MH-53J/M: 9000 x 7.62mm, 700 x 50 cal.

Note 5: Operations at Emergency War Plans gross weights require waiver. With a combat ammo load, AC-130s routinely take off waived to 165,000 lbs and with only 42,000 lbs of fuel.

Note 6: Computed for OGE Hover + 5% at 2000 ft and 20C (68F), military power, no wind.

Note 7: MC-130 operations using NVGs require 3500 ft landing strips. For CV-22, 150 x 150 is the size of a hover LZ, 1280 feet is the length of runway needed at 2000 ft and 20C for a rolling takeoff with 60deg nacelle angle at max gross weight (60,500 lbs).

LIMITS // AIRCRAFT (Note 1)		MC-130P	P (1)	P (2)	MC-130E	MC-130H	H (1)	H (2)
Weight	Min Deployment Gross Weight (lbs) (Note 2)	90,000	91,000	92,000	102,000	95,000	96,500	98,000
	Min Employment Gross Weight (lbs) (Note 3)	92,000	93,000	94,000	105,000	97,000	98,500	100,000
	Max Gross Weight (lbs)	155,000	155,000	155,000	155,000	155,000	155,000	155,000
	EWP Max Gross Weight (lbs) (Note 5)	175,000	175,000	175,000	175,000	175,000	175,000	175,000
	Max Gross Weight to Hover (lbs) (Note 6)	-	-	-	-	-	-	-
Fuel	Max Internal Fuel (lbs)	61,308	61,308	61,308	61,308	61,308	61,308	61,308
	Max External/Aux Fuel (lbs)	-	11,560	23,000	-	-	12,000	24,000
	Start/Taxi/Take Off Fuel (lbs)	1,300	1,300	1,300	1,300	1,300	1,300	1,300
	Required Reserve Fuel (lbs)	6,000	6,000	6,000	6,000	6,000	6,000	6,000
	Planning Fuel Flow - Employment (lbs/hr)	6,000	6,000	6,000	6,000	6,000	6,000	6,000
	Planning Fuel Flow - Deployment (lbs/hr)	5,500	5,000	5,000	5,000	5,000	5,000	5,000
Speed	Planning Employment Speed (kts GS)	220	220	220	230	230	230	230
	Dash Speed -- Employment (kts GS)	275	275	275	275	275	275	275
	Planning Deployment Speed (kts GS)	300	300	300	300	300	300	300
Load	Troop Seats - Airdrop Config	26	18	10	34	52	18	16
	Troop Seats - Airland Config	50	18	10	56	77	51	35
Alt	Min Employment Altitude (ft AGL)	300	300	300	250	250	250	250
	Max Employment Altitude (ft MSL)	27,000	27,000	27,000	27,000	27,000	27,000	27,000
	Deployment Altitude (ft MSL)	25,000	25,000	25,000	25,000	25,000	25,000	25,000
LZ	Normal Runway Required (ft)	3000 x 60	3000 x 60	3000 x 60	3000 x 60	3000 x 60	3000 x 60	3000 x 60
	Employment Landing Zone Size (ft) (Note 7)	3500 x 60	3500 x 60	3500 x 60	3500 x 60	3500 x 60	3500 x 60	3500 x 60

Note 1: Number in parenthesis indicates number of external/aux fuel tanks. For all descriptors, "Deployment" refers to normal permissive area flight profile.

Note 2: Aircraft empty weight plus deployment crew, their baggage, and equipment normally taken on deployment ferry flights.

Note 3: Aircraft empty weight plus chaff and flare, tactical crew, their personal equipment, and other equipment.

Note 4: Combat Ammo Load -- Cv-22: 800 x 50 cal. MH-53J/M: 9000 x 7.62mm, 700 x 50 cal.

Note 5: Operations at Emergency War Plans gross weights require waiver.

Note 6: Computed for OGE Hover +5% at 2000 ft and 20C (68F), military power, no wind.

Note 7: MC-130 operations using NVGs require 3500 ft landing strips. For CV-22, 150 x 150 is the size of a hover LZ, 1280 feet is the length of runway needed at 2000 ft and 20C for a rolling takeoff with 60deg nacelle angle at max gross weight (60,500 lbs).

Army Assets²

MH-60L BLACKHAWK. The primary mission of the MH-60L is to conduct overt or clandestine infiltration, exfiltration, and resupply of SOF across a wide range of environmental conditions. Additionally, the MH-60L/DAP has the primary mission of armed escort and fire support. Secondary missions of the MH-60L include external load, Personnel Recovery (PR) and MEDEVAC operations. The MH-60L is capable of operating from fixed base facilities, remote sites, or ocean going vessels. The MH-60L Blackhawk is a highly modified twin-engine utility helicopter that has been specially modified for long range Special Operations (SO) flights. The aircraft can be configured with a number of auxiliary fuel systems to allow for operational times of as much as 5.5 hours with a range of 640 nautical miles. The MH-60L is equipped with secure communications: HF AM w/ALE, UHF, VHF AM/FM, SATCOM and Sabre communications. The a Fast Rope Insertion Extraction System (FRIES) allows for rapid insertion and extraction of personnel in areas blocked from air-land maneuvers. The aircraft is equipped with 2 M-134 7.62mm Miniguns, Ballistic Armor Sub-System (BASS), and a suite of Aircraft Survivability Equipment (ASE) to increase aircrew survivability in all threat environments. Dual Global Positioning Systems (GPS), Doppler and weather detection systems allow pinpoint navigational and weather avoidance capability. Mission flexible systems include cargo hook for external load operations, Personnel Locator System (PLS) for PR, and a six place Command and Control console for airborne C2 operations. An armed version of the MH-60L, the Defensive Armed Penetrator (DAP), is capable of mounting two M134 7.62mm miniguns, two 30mm chain-guns, two 2.75 rocket pods, Hellfire missiles, or combinations of the systems for armed escort and fire support operations.

MH-60K. The primary mission of the MH-60K is to conduct overt or clandestine infiltration, exfiltration, and resupply of SOF over a wide range of environmental conditions. The MH-60K is capable of operating from fixed base facilities, remote sites, or ocean going vessels. The MH-60K Blackhawk is a highly modified twin-engine utility helicopter. The aircraft can be configured with a number of auxiliary fuel systems to allow for operational times of as much as 5.5 hours with a range of 634 nautical miles. The MH-60K is equipped with secure HF, SINCGARS, FM, UHF, VHF, SATCOM and MX communications. The Fast Rope Insertion Extraction System (FRIES) allows for rapid insertion and extraction of personnel in areas occluded from air-land maneuvers. The aircraft is equipped with 2 M-134 7.62 Gattling guns, Ballistic Armor Subsystem (BASS), and a suite of Aircraft Survivability Equipment (ASE) to increase aircrew survivability in all threat environments. Global Positioning System (GPS), TRN, INU, AHRS, and Multi-Mode radar systems allow pinpoint navigational. Mission flexible systems include cargo hook for external load operations and Personnel Locator System (PLS) for CSAR.

² All data from "Special Operations Aviation (SOA) Assumptions, Planning Factors, and Performance Data Guide." *Joint Mission Analysis 2004-2009*. USSOCOM SORR, February 2001. Data not meant to be all-inclusive. For comprehensive mission employment information see AFTTP 3-1 (classified).

MH-47D. The MH-47D conducts overt and covert infiltration, exfiltration, air assault, resupply, and sling operations over a wide range of environmental conditions. The aircraft can perform a variety of other missions including shipboard operations, platform operations, urban operations, water operations, FARP operations, mass casualty and personnel recovery. The MH-47D can also conduct Amphib 2/Delta Queen missions. The MH-47D is a twin engine, tandem rotor, heavy assault helicopter that has been specifically modified for long range flights. It is equipped with secure voice communications on FM, UHF with Have Quick II, VHF (AM/FM) HF/ALE, Sabre and SATCOM radios; a Fast Rope Insertion Extraction System (FRIES) for insertion of personnel/equipment and extraction of personnel; aircraft survivability equipment; a defensive armament system consisting of two M-134 machine-guns (left forward cabin window, right cabin door); an internal rescue hoist with a 600 lb. capacity and an external rescue hoist. The MH-47D is equipped with weather avoidance/search radar; an aerial refueling (A/R) probe for in-flight refueling; a Personnel Locator System (PLS) used in conjunction with the PRC 112 for finding downed aircrews; Forward Looking Infrared (FLIR); and a navigation system consisting of a Mission Computer utilizing GPS/INS/Doppler navigation sources for increased accuracy. It is instrument flight capable with ADF, VOR/ILS, DME, and TACAN with the ability to perform fully coupled approaches. Mission computer generated approaches can be used when “normal approaches” are not available. A fully coupled flight director system is provided to reduce crew workload. The MH-47D helicopter is capable of operating at night during marginal weather conditions. With the use of special mission equipment and night vision devices, the aircrew can operate in hostile mission environments over all types of terrain at low altitudes during periods of low visibility and low ambient lighting conditions with pinpoint navigation accuracy +/- 30 seconds on target.

MH-47E. The MH-47E conducts overt and covert infiltrations, exfiltrations, air assault, resupply, and sling operations over a wide range of environmental conditions. The aircraft can perform a variety of other missions including shipboard operations, platform operations, urban operations, water operations, parachute operations, FARP operations, mass casualty and combat search and rescue operations. The MH-47E is a twin engine, tandem rotor, heavy assault helicopter specifically designed and built for the Special Operations Aviation Mission. It has an integrated avionics subsystem which combines a redundant avionics architecture with dual mission processors, remote terminal units, multifunction displays and a display generator, which improves combat survivability and mission reliability; an aerial refueling (A/R) probe for in flight refueling; external rescue hoist; two L714 turbine engines with Full Authority Digital Electronic Control (FADEC) which provides more power than the CH-47 during hot/high environmental conditions; and two integral aircraft fuel tanks providing 2068 gallons of fuel. It is equipped with secure voice communications on FM (SINGCARS), UHF with Have Quick II, VHF (AM/FM), HF, SATCOM, Personnel Locating System (PLS), Ground Comm. (Sabre), and Automatic Target Handover System (ATHS) radios; Fast Rope Insertion Extraction System (FRIES) for insertion of personnel/equipment and extraction of personnel; an extensive and comprehensive Aircraft Survivability Equipment (ASE) suite; Forward Looking Infrared (FLIR), and a Map Display Generator (MDG) which displays a digitized moving map for pilot navigation. Additionally the MH-47E is equipped with

Stormscope for thunderstorm avoidance. The MH47E helicopter is capable of operating at night during marginal weather conditions. Multi-Mode radar systems allow pinpoint navigation. With the use of special mission equipment and night vision devices, the air crew can operate in hostile mission environments over all types of terrain at low altitudes during periods of low visibility and low ambient lighting conditions with pinpoint navigation accuracy +/- 30 seconds time on target.

CAPABILITIES COMPARISON CHART

	MH-60L	MH-60L (DAP)	MH-60K	MH-47D	MH-47E
Cruise Speed (kts)	120	120	110	120	120
Flight Time (Std Tanks)	1+45	1+40	1+30	2+08	4+30
Range (nm) (Std Tanks)	212	200	165	256	540
Air Refuelable	X	X	X	X	X
Passengers	12	0	14	26	37
Max Pax (- seats/rucks)	17	0	23	60	65
Landing Area (ft)	100X100	100X100	100X100	300X300	300X300
UHF	X	X	X	X	X
HF	X	X	X	X	X
VHF(FM/AM)	X	X	X	X	X
SATCOM	X	X	X	X	X
SINCGARS	X	X	X	X	X
Sabre	X	X	X	X	X
ATHS	X	X	-	X	X
M134 7.62mm Minigun	X	X	X	X	X
M230 30mm Chain Gun	-	X	-	-	-
M260 7-shot Rocket	-	X	-	-	-
M261 19-shot Rocket	-	X	-	-	-
AGM-114 Hellfire(max)	-	X	-	-	-

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